Theories and Principles of Design in the Architecture of Islamic Societies

The Aga Khan Program for Islamic Architecture
Theories and Principles of Design in the Architecture of Islamic Societies

A symposium held by the Aga Khan Program for Islamic Architecture at Harvard University and the Massachusetts Institute of Technology, Cambridge, Massachusetts, November 6-8, 1987.

Cambridge, Massachusetts 1988

The Aga Khan Program for Islamic Architecture at Harvard University and the Massachusetts Institute of Technology
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Editor. Margaret Bentley Ševčenko
Design/Production. Benson & Clemons/BCOM Design
ISBN 0-922673-10-1
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The symposium, "Theories and Principles of Design in the Architecture of Islamic Societies," held at the Massachusetts Institute of Technology in November 1987, represented a modest beginning in the search for a contemporary theory—or theories—of architecture and urban design in Islamic countries. Its attendance (over two hundred people, more than fifty of them coming from abroad to attend) indicates the importance many people in the Islamic world and beyond attach to the subject.

There were two immediate reasons for organizing the symposium. The first was the natural curiosity that anyone acquainted with Islamic architecture might have about its sources and mainsprings. The second was the belief that the time had come to tackle the vexed issues of identity, place, and appropriateness, and to suggest that theories of architecture and design in Islamic societies need to be developed. Architects working in the Islamic world frequently claim that their work is based on Islamic precedent. Now that the volume of building activity of the last ten years has slowed, it seemed a good time to pause and consider their arguments. How much validity is there in that idea and in what ways can an analysis of precedent, where it is seriously employed, actually work to catalyze or enhance the architecture of today?

An important aspect of the symposium was that it brought together architects, urban designers, planners, sociologists, economists, historians, educators, and students with diverse interests to consider the common and difficult question of how historical precedent should be used to inform the present. We hoped to hear the historians' reactions to architect's claims about the use of precedent, and perhaps the architects' views on some of the directions which they would find useful and which may be lacking in historical research. For that reason, the first day was devoted to the presentation of historical theories of architecture and design in the Islamic world as they have been revealed in recent research. The first half of the day was devoted to approaches known to have been taken in the design of buildings and the second half to methods of design used for the ornamentation and decoration of buildings in the past.

The second day was devoted to presentations by practicing architects on the theories of design in contemporary architecture which they were investigating or had actually used in their own work. We anticipated that the architects would show their work and explain the use they made of one or another Islamic precedent, but in fact much of what they showed was based, not just on one approach, but on a combination of approaches. Discussion ranged from concerns with the interpretation of Islamic cosmological symbolism to the pragmatic or systematic deduction of principles from Islamic precedent. Also considered were specific approaches to architecture which rendered it regionally appropriate, through its use of appropriate technology and its response to environmental
Considerations such as climatic constraints. Finally the means of developing theories of architecture were considered which were based on the new building programs and scales of projects in the Islamic world.

In these proceedings the reader will discover the extent to which the symposium lived up to expectation. Most the participants felt that discussion on the subject had at last been opened at an international forum and hopes were high that further exchanges would eventually lead to the development of a theoretical basis for the work of designers throughout the Islamic world. We all shared a challenge—to tackle a difficult subject and take stock of our various positions on it today. With this effort we moved another step in the direction of building a corpus of ideas about the directions architecture is to go in Asia and Africa. This is an essential step if we are to be successful in providing built environments in the Islamic world with which future generations can identify with ease.

In conclusion I should like to thank Dean John de Monchaux of MIT’s School of Architecture for his participation. I would also like to express our real debt of gratitude to the organizers, particularly seminar coordinator Akhtar Badshah, his assistants Sikander Khan and Amer Moustafa, and to Sharon Black, Jill Bogosian, Nina Kaull, Judy Tucker, and Kim Watson for their invaluable aid in organizing every detail of the symposium.

Ronald Lewcock

Cambridge, MA
June 1988
ARCHITECTURAL
THEORIES AND
PRINCIPLES
OF DESIGN
IN THE PAST
Theories and Principles of Design in the Architecture of Islamic Societies
CHAPTER 1

Text, Plan and Building: On the Transmission of Architectural Knowledge

Renata Holod

This paper will explore the various possibilities for interpreting the phrase found in a historical text, "... and a plan/drawing (tarn) was sent." A scenario will be constructed, beginning with the initial idea for a building by the patron/client and continuing to the building itself with special reference to the types of information that were available and which of them were transmitted. A model will be proposed for how architectural knowledge was transmitted, taking into consideration the relationship of center and region, local knowledge, and available types of written and visual accounts.

Let me begin by paraphrasing from the 1950 work of L. A. Mayer, *Islamic Architects and Their Works*; Mayer pointed out that one of the most striking features of Islamic civilization is that, rich as it is in monumental architecture, it has left us only scanty information, whether historical or legendary, about the architects who erected its buildings. In contrast to the Romans or the High Renaissance architects, Islamic architects have for the most part been relegated to the same anonymity as their counterparts in the medieval West. It is now time to put this pronouncement to rest, notwithstanding the fact that the edition and translation of a most significant document in the history of Ottoman architecture, *Risale-i Mi'ariyye*, recently brought out by Howard Crane still harks back to Mayer's formulation. The fact that it must do so merely underlines the paucity of new and regionally or chronologically differentiated work in the field of architectural documentation.

The early statement also had a flaw inherent in its formulation, namely that the civilizations of the High Renaissance and of ancient Rome are in any real sense comparable to Islamic civilization, particularly in the realm of their supra-regional cultures of architecture. The High Renaissance, and its culture of architecture, was based on the printed book, with its easy dissemination of visual, formal and codified information and with an elaboration of vocabulary and theory driven by this new medium. Roman architectural culture was much more single centered, driven by imperial monumental requirements, propagated from a single source, and disseminated through paramilitary means. Islamic civilization, and particularly its culture of architecture, should not be treated in either of these terms.

Nor is Islamic civilization really comparable to Western medieval tradition. It is a multicentered, multiregional, and multiperiod civilization. Its culture of architecture was formed from regional building traditions (those well springs of what Clifford Geertz has called "local knowledge"). Certain of these regional traditions emerged to play the role of supra-regional centers with modes of transmitting architectural knowledge through example and through verbal or visual notation. These modes of transmission can be understood to be continuing earlier traditions in architecture and the building trades. Yet such assumptions of continuity do not allow for the explanation of any aesthetic, structural or spatial
innovations which can be observed in the products of the major architectural centers of the Islamic world. I hope to discuss this problem more extensively in a subsequent study.  

Although Islamic civilization has been considered the conservator and transmitter of science and technology of the Hellenistic past, one of the essential ways in which it differed from this and other pre-industrial civilizations is that it became a paper civilization. It is common knowledge that paper was introduced into the Middle East in the eighth century, when Muslim troops captured Chinese papermakers in Central Asia, and that sometime in the subsequent two centuries the technology of papermaking was altered there. Its raw material was no longer bamboo, but rags and old paper. The appearance of this new, cheaper, and recyclable medium and its impact on modes of transmission of knowledge, literacy, development of libraries and systems of notation may need to be considered afresh. In the process of constructing a building, from the initial order (or program), to design and layout, to on-site work, accounts, and representation of the finished building, the appearance of paper is an element in the process of transmission and reception of architectural knowledge whose discardable, recyclable aspect still needs to be discovered.

Having said this, let me now proceed to examine briefly several paper documents and then to propose how their very existence and type allow us to model a process of architectural culture. This is a process which could play itself out between two poles of literate architectural knowledge, where change could be rapid and transregional, and the local knowledge of building cultures where change is on a slower time scale, where replication is prized, and where transmission is mostly by example or by gesture and less by architectural notation and description.

From Ibn Ghaliib, Farhat al-Anfus (sixth century), quoting an earlier text,

According to Maslama, the architect (muhandis) in charge of the construction of the city palace of Madinat al-Zahra, the daily number of finely cut, polished stones used for facing was 6,000 marble slabs produced by three stonecutters at 10 dinars qusimiyu; the daily loads of plaster 500; the daily loads of gypsum 500; daily number of oxen employed 1,000, of these 400 belonged to the sultan and 100 were hired at 3 golden dinars per month totaling 3,000 dinars; daily workmen were 1,000, of these 500 daily laborers, 200 carpenters, 300 skilled builders (huddaq al-bina' al-binat) not counting slaves and prisoners of war; total numbers of columns used were 4,000, 1,013 from Ifriqiyya, 19 from Bilad al-franj, and 140 gifts from Rum, the rest from al-Andalus, 15,000 door leaves, some sheathed with iron, some with brass, others of carved or inlaid wood

Later, the author summarizes another source, Nafh al-tib: every day 10,000 men were working there; work lasted twenty-five years in the reign of al-Nasir, fifteen in the reign of his son al-Hakam who completed it. Expenditure in the reign of al-Nasir amounted to 300,000 dinars, each year 7,500. Quoting Ibn Hayyan, he gives the dimensions of Madinat al-Zahra with and without gardens; a third of the yearly treasury went to Madinat al-Zahra during the construction period, with yearly expenditures of 30,000.

While much fuller accounts of building activity, in particular from the Ottoman period, are still extant and can be profitably examined, I chose to present this text as it is fairly unknown and early twelfth century; it also encapsulates earlier materials which may in fact still record a pre-paper architectural culture.

Several comments are in order. The first is that the chief of works, though he is a geometry himself, is in fact concerned with numbers and expenditures. Thus though he had technical training, his role in the enterprise also involved overall
management. The second is that accounting and treasury figures were written in script and could easily be incorporated into materials for histories and easily transferrable by a later collector of data, such as the twelfth-century author who incorporated the earlier account for purposes other than the detailed architectural description of the proj. of Madinat al-Zahra. Any architectural notation, whether already on paper or still on parchment or papyrus, may not have been prized or even meaningful to the literati who compiled histories later on. For that reason this kind of information was never transmitted through the book culture.

A third comment is that the project took twenty-five years to complete, longer than one professional lifetime of a chief of works or an architect, and therefore such a project had to have had a complex notation of land surveys, if nothing else. Those working on the project for their lifetime were transformed by it, as they transformed it. In this case, the local knowledge or the local building culture is too fragmentarily known to record the entire transformation. The local culture put great store in collecting and embellishing the monumental buildings with marbles and columns, features shared by many Mediterranean post-antique cultures. No doubt, such a project also generated a distinct morphological vocabulary over time to which we have only imagined access. All this challenges the pervasive idea that Islamic architecture was a single-patron process, though this idea still needs to be investigated. But I suspect this text is representative of the process of a project.

The second text I would like to examine briefly is Fi ma yasta'ju illaihi as-sani' min 'alam al-handasa of Abu-l Wafa' al-Buzjani (940-98) who came from the opposite end of the Islamic world, from Khorasan, but was active in Baghdad. His main claim to fame is as a theoretical mathematician. For a fuller understanding of the relationship of applied geometry to architecture, other and less renowned individuals still need to be studied. It is his work, however, on what the craftsman should know of geometry, which has been made available to non-specialists through the efforts of Krasnova and Bulatov. Krasnova’s work presents one of the two known Arabic copies of the manuscripts, that in Istanbul; Bulatov’s later works are based on the known Arabic and Persian copies.

The importance of this text cannot be overestimated, for it reveals the existence of a written genre of works for craftsmen. If the audience for the work was indeed the craftsmen (and not just the author’s immediate circle of colleagues), al-Buzjani assumes a modicum of literacy among them. The fact that his work was translated into Persian soon after it appeared only testifies to its popularity. The translation was begun by Najm al-Din Mahmud and completed by Abu Ishaq ibn ‘Abdullah Kuynani Yazdi, on the instruction of his teacher, the muhandis Shams al-Din Abu Bakr, whose grandfather was called Abu Banna’.

The work is a practical handbook; it does not dwell long on the complex mathematical aspects of geometry, but rather offers a constructive hands-on version of geometry explained in fairly straightforward language. It deals with such well-known problems as dropping a perpendicular to a plane (or, as the author says to a flat wall, a piece of land, or to a roof), the trisecting of angles, the sectioning of quadrilaterals and spheres (figs. 1-2), the construction of regular polygons, the transformation of polygons, and the inscription of polygons into circles and other figures. The Istanbul copy came from the library of Ulugh Beg in Samarkand; the copy of the Persian translation found in the Bibliothèque Nationale is also from the Timurid period. With the latter is an anonymous treatise on the introduction to like and congruent figures written in Persian. It is also awaiting a study fuller than the shortened version available in the appendix to Bulatov’s book. It shows a variety of geometric figures, patterns and constructions which Bulatov has developed into tiling patterns.
These two works indicate that treatises of practical geometry did exist and that they were in continuous use. That they are not found in vast numbers in major manuscript collections may be attributable to their very practical success rather than their rarity at the time of their creation. The appendix, for instance, judging by Bulatov’s analysis, deals with such basic problems for Islamic architects after the eleventh century as the construction of a muqarnas plan, geometric ornament, notation of the third dimension in a non-perspectival fashion, as well as many other building and architectural problems which I will not detail here. These texts allow us to introduce into our model the presence of a written as well as mnemonically derived system of geometric construction which in its essence is formal and self-conscious, and more easily transmittable over distance by paper than by example or gesture.
The third type of paper document I would like to introduce is represented by the plans and drawings of the so-called Bukhara master.\textsuperscript{12} This set establishes the existence of architectural notation on paper, and its sophistication points to a long, though as yet unknown, tradition. Most of the drawings are of geometric ornament, and could be allied to the previously cited text. Four are ground plans (figs. 3, 4, 5) on carefully constructed graph paper and are comparable to analogous modern plans in that they show a horizontal section taken at ground level or a some fixed point above the foundation. There is even the same graphic convention, a regularized net of crosshatching, to indicate the wall thickness, stairs in light and dark, and projected ceiling elements.

Figure 3: A probable plan of a mausoleum (after Balkanov, plan 2).

Figure 4: A probable plan of a sardab or ab-anbar (after Balkanov, plan 4).
The use of graph paper is most significant. It tells us that the draftsmen worked with compasses and straight edges, the ancient tools of Euclidean geometry. Any geometric form was quickly plotted out, making transformations of inscribed polygons, diagonals, and segments. Bulatov sees this series of transformations as all-important, extending into three dimensions and determining elevations.

But gridded paper imposes a standardized module on the design which has consequences for the design process, if only as a neutral measuring device. In this compositional use of graph paper, the location of the major and minor features of the grid would be a desired goal. What is extraordinary about these drawings is that no element of the buildings, no spur or buttress, fails to coincide with the graph of the diagonals of its squares. The module of the grid provides the basic structural unit, and structural necessity is almost subservient to design.

Could these have comprised a student book, or a collection of building types, and not specific and eccentric buildings? The drawings appear to be finished and carefully drawn in a three-color scheme. Their academic dryness, symmetry, and draftsmanship may suggest a series of ideal designs. If they are drawings by a designer, the module represents the standard building unit. The making of the plan, then, could be a function separate from the site construction itself, and the grid the measured module. Or were these presentation drawings—as suggested by their legibility and rooms outlined in red and green—that were meant to carry enough information for the non-architect to envision the completed building? These are not questions which can be answered here, though the existence of even later drawings on paper would indicate that designs for geometric ornament (and there may be a close association between these and the plans in their mode of notation) were carefully executed and kept as privileged information. The best known are the designs belonging to Mulay Hafid. Perhaps less well publicized is a sheaf of drawings from a Shirazi family dating from about 1870 (fig. 6 and 7), on which the process of making a grid and developing the design can be observed.
The fourth text is also a fragment of a work, now a single sheet found bound together with two Safavid firmans. The top of the sheet bears the title, "On the Knowledge of Buildings and Their Design," in the same hand as the rest. The text is written in a very simple, straightforward Persian, jammed full of technical terms without literary embellishment. It reads almost like a page from an instructional manual or a similar technical booklet, and is very careful to give what may have been other names (perhaps other regional variants). The fragment may be seen as a part of a Safavid (Isfahani-royal) building vocabulary which assumed technical and constructional knowledge on the part of the reader. It mentions that "the great palace must have muqarnas in its vault; it must have squinches. . . . The porch talār must have an iwan in front of it. . . . The royal buildings must not have flat roofs; more often they have a ṭaq-i ṭavaq. . . . in the royal building there must be relief work. . . . the talār must be based on columns, and a roof which has no overhang would be uncomfortable because of the sun.\textsuperscript{16}

The transmission of architectural knowledge thus could be achieved through any or all of the types of documents described here. The introduction of paper as the medium of transmission still needs to be further studied. At this point, though, the existence of these types of documents allows us to explain such anomalies as the introduction of totally new types, styles, and structures into the body of local architectural knowledge. Such is the case, I believe, with the appearance of the muqarnas in every major region of the Islamic world by the end of the eleventh century. And to return to the beginning of this paper, such is the case in the Masjīd-i Jami\textsuperscript{1} of Yazd, whose plan and decoration and structural innovation are wholly foreign to the local culture and probably closely modeled on the no longer extant Masjīd-i Jami\textsuperscript{1} in Sultaniyya (figs. 8 and 9).\textsuperscript{17} But even when the transmitted
Figure 7: Drawings for ornament on a grid (after Khanlari, nos. 3, 18, 19).
Figure 8: View of the Masjid-i Jami’ of Yazd.

Figure 9: View of the Masjid-i Jami’ of Sultanliyya, from Nasuh al-Matraqli’s view of Sultanliyya made ca. 1537. From Istanbul University Library, ms. T3964.
and intended building was realized in the local building culture the seeming separation we have noted between place of design and place of construction existed.

One of the most telling examples that document the existence of a difference between the design intent of a building and its eventual realization is the famous mepris of the Masjid-i Jami' (Bibi Khanum) of Samarqand, where the plan of the dome as designed and as realized by local builders was entirely different (fig. 10). The original design with its specified narrower piers (outlined in black) had foreseen a dome on a pendentival system. The building appears to have been laid
out and built up to a certain height with this in mind. At this time, either the instructions were changed or a different group with other building traditions seems to have taken over and returned to their own system of transition. The already constructed piers were widened and the pendentives shifted to squinches.

Thus the model for architectural transmission begins with the intent of the patron and architect or builder (we often find texts that describe the ordering of buildings in terms of features considered most significant—size of building or dome). The process involved in finishing the building may have included plans and drawings, and it certainly included accounts. It also may involve encounters with the local culture of building and its modes of replication. The result was the building itself. It is only in this context that change and innovation in design and structure can be tracked, unfolding, as it were, over a backdrop of continuing local traditions. The supra-regional elements of transmission whether verbal or visual, were on paper; the local traditions continued to be transmitted mostly by gesture. Both are based on, and tied together by, a thorough knowledge of geometric construction.

Notes

1 Leo Mayer, *Islamic Architects and Their Works* (Leiden, 1950), p. 20

2 Howard Crane, *Risale-i Mi'mariyve* (Leiden, 1987). On Ottoman construction practices in Egypt, see Nelly Hanna, *Construction Work in Ottoman Cairo (1517-1798)*, suppl to *Annales Islamologiques*, 4 (Cairo, 1984)

3 Clifford Geertz, *Local Knowledge* (New York, 1983) In this context, the two recently discovered and newly published architectural drawings on parchment from the eighth-century Qur'an found in the mosque of Sana'a would indicate a particular mode of architectural notation and representation from earlier Mediterranean sources; cf. Hans-Caspar von Bothmer in *Pantheon*, 1987, though this aspect still needs further investigation

4 A more thorough awareness of the history of engineering may be necessary, as suggested by George Saliba (personal communication, spring, 1988), e.g., the works of the Banu Musa ibn Shakir, specifically their work on the measurement of plane and spherical figures, may yet yield sharper insights into the problems proposed in this paper. The more general discussions by Donald Hill, *A History of Engineering in Classical and Medieval Times* (London and Sydney, 1984), and Ahmad Y al-Hassan and Donald Hill, *Islamic Technology* (Paris, 1986), provide useful, if preliminary, background


6. The relationship between empirical, on-site craft know-how and architectural description, notation, and representation still needs further study within the variety of chronological and regional contexts. The term "by gesture" is Joseph Rykwert's, and I would like to use this opportunity to thank him for discussing aspects of architectural notation with me

7 I thank Leonor Fernandes for bringing this text to my attention; she came across it in her work for the University of Pennsylvania project on Law and Architecture funded by the Aga Khan Foundation. The manuscript is in the library of the Arab League


10. In particular, the above-mentioned Istanbul copy and the Persian version, Bibliothèque Nationale, ms persane 169, which were accessible to him through translations of Krasnova and Vildanova as well as photocopies of the actual ms. In his earlier study of the Samanid mausoleum, Mavzolei Samanidov—Zhenschushyta Arkhitektury Srednei Azii (Taslikent, 1976), pp. 87 and ff, he proposes a theoretical basis for the architecture of this and related monuments based on a harmony of parts, drawing from the work of al-Buzjani, the Ikhwan al-Safa’ and others. In his later work, Geometrichesklia Gamorizatsia v Arkhitektury Srednei Azii IX-XV vv (Moscow, 1978), he has expanded his inquiry to include the key monuments in Central Asia, an introduction on treatises for architects (chap. 3), and a note on the education of architects (appendix 1). While these works are extremely important, an edition of all the manuscripts, their translation into English, and a study announced by Wasma’ Chorbachi me all long awaited.

11. Bulatov, Geometricheskia, appendix 2, pp 325-52. Lisa Golombek (personal communication, fall 1987) is of the opinion that some drawings in the appendix may be of Timurid date. Now see her comments on this and related topics in her and Donald Wilber’s work on Timurid Architecture of Iran and Turan (Princeton, 1988).

12. To this day, the best publication of the drawings, which were found in rolls in box 16-23 in the State Library of the Uzbek SSR, and are now in the Oriental Institute of the Uzbek SSR Akademiya Nauk, is Balkanov’s article, “ArchitekturiniiechetetezhUzbekovomasteraXVIveka,” SoobshchenieInstitutoIstoriitTeori Arkhitektury (Akademiia Arkhitektury SSSR IV) (1944), pp. 111-221. Although all subsequent work on the process of production of architecture in Central Asia is directly or indirectly based on this article and on the fact that these drawings exist, I have not yet been able to obtain better reproductions of them.


16. I thank Marco Brambilla for showing this text to me and allowing me to quote from it. We hope to publish the complete text with a technical glossary.

CHAPTER 2

Ottoman Classical Mosques in Istanbul and in the Provinces

Aptullah Kuran

In the sixteenth century the Ottomans established an architectural office in Istanbul to disseminate the principles and the technology that had been developed for building in the capital. The Corps of Court Architects was an efficient organization. Projects initiated in Istanbul were executed in the provincial towns with maximum speed. The quality of architecture in the provinces, however, seldom reached the level it attained in the capital. The main reason for this disparity stemmed from the nature of Ottoman architectural practices of the time. Although a rational system of design existed, it was difficult to transmit this system to the provinces by elaborate drawings. And since the execution of the Ottoman design system depended on making decisions on the construction site rather than implementation of drawings prepared by the central office, a building could only be as good as the artistic skill and sensitivity of the court architect who constructed it.

The exact foundation date of the corps of architects is not known. But since the earliest reference to a chief architect (ser mimaran-i hassa or mimarbası) occurs in connection with Alaeddin, we can assume that it took place after 1514 when Selim I brought Alaeddin to Istanbul from Tabriz after the Battle of Chaldiran. A register dating from the early 1520's1 entitled “Aghas of the Artisans’ Community” (Cemaat-i Agayan-i Ehl-i Hiref) shows that Chief Court Architect Alaeddin received a daily stipend of 45 aspers (akçe), while the seventeen architects who worked under him were paid from 7 to 23 aspers a day.2

The number of court architects arose from seventeen to more than thirty during the fifty-year tenure of the great Sinan, who was appointed chief court architect upon Alaeddin’s death in 1538 and held it until his own death in 1588.

The duties of the court architects were many. They prepared the designs, procured the materials, and kept the construction books for all the religious and civic buildings, bridges, aqueducts, and reservoirs ordered by the court. They inspected and approved all major architectural projects throughout the empire. They estimated the costs of all projects undertaken by the pious foundations (waqfs) and endorsed all expenditures pertaining to maintenance incurred by their trustees. They examined and corrected the designs of houses and shops submitted by individuals to their office. Before issuing a building permit, they made certain that the artisans employed to execute the project were qualified members of their trade and that the materials used in the construction were up to standard. They set the wages of all construction workers. They periodically spot-checked brickyards, marble and stone workshops, and ceramics factories and reported their findings directly to the imperial council (Divan-i Hümayun).3

The procedure for executing a project was as follows: First, the chief architect or one of his subordinates, depending on the importance of the proposed building, was appointed executive architect. Then a construction manager (bîna emîni) was
assigned to keep the books and handle administrative matters. Later, the designs and the cost estimates were examined and approved by the chief architect, and then submitted to the imperial council. When they had been approved, the project was executed by the architect in charge. In the case of provincial projects, a local architect was also assigned to help with the construction.4

The Corps of Court Architects was an effective organization. Control from the center produced an efficient administrative system. On the other hand, it did not create aesthetic uniformity. A distinct difference between the architectural quality of the buildings designed and constructed by the corps in Istanbul and those in the faraway provinces was evident.

Before considering the reasons for this disparity, I would like to discuss briefly seven middle-sized Ottoman mosques. Two of these (the Edirnekapı Mihrimah Sultan and the Sokollu) are in Istanbul; another two (the Defterdar Mustafa Paşa and the Pertev Paşa) are in, respectively, Edirne and İzmit—two towns within easy reach of the capital; and the remaining three (the Sultan Selim in Karapınar, the Cenabı Ahmed Paşa in Ankara, and the Hüsrev Paşa in Van) are in distant provinces of the Ottoman Empire.

The Edirnekapı Mihrimah Sultan (figs 1-2), built during the first half of the 1560's by Süleyman the Magnificent's daughter,5 is a multidomed mosque with a courtyard surrounded by madrasa rooms. Its laterally set rectangular hall is surmounted by a central dome, 20.25 meters in diameter, flanked on either side by three 6.00 meter domes in a row. Inside, the triple domes are supported by a pair of granite columns. Between these the lofty central dome rises on four pillars which turn into weight towers above the cornice level to rivet the four great arches of the square baldachin.

The clarity of the architectural composition derives from the accentuation of the great arches. They are pulled out from the many-windowed walls, which only support their own weight, to give the load-bearing arches a structural definition.

By making a separate entity of the central dome through exaggerating its height and by contrasting the heavy solid arches with lace-like curtain walls on four sides, Sinan achieved in the Mihrimah Sultan a singularly dramatic architectural expression.

The Sokollu mosque in Istanbul (figs. 3-4), dating from 1571-72, again comprises a laterally set hall. Its central dome measures 13.00 meters across and sits directly on the qibla wall in the south, on two pillars in the north, and on double half-domes in the east and west. The side wings under the half-domes make a 60-degree angle with the front and back walls.

Equally worthy of note are the six stained-glass panes over the mihrab. They are among the best examples of this form of Ottoman art. More important than the stained glass panes are the exquisite faience tiles decorating the central section of the qibla wall. The mihrab, drum, and cap above the minbar's kiosk and the six pendentives shouldering the main dome are also covered with tiles. Set against the ivory hue of the stone finish of the walls, the floral designs in brilliant colors produce a striking contrast.

The Sokollu mosque is a good representative of Ottoman architectural ideals of the classical period because its interior has been freed of columns, and the superstructure, which sits directly on the walls, enhances the sense of unity and spatial integrity.

The Defterdar Mustafa Paşa Mosque (fig. 5) in Edirne (ca. 1576) stands on the left-hand side of the Istanbul road as one enters the city from the south.6 Its walls are constructed of stone courses alternating with two rows of brick. On the north, the portico has four windows—two on either side of the door. Each of the other
Figure 1: Istanbul, Edirnekapı Mihridah Sultan Mosque. Plan.

Figure 2:
Figure 3: Istanbul, Sokollu Mosque. Plan.

Figure 4: Istanbul, Sokollu Mosque. Interior.
three walls contains four two-tiered windows plus a ninth on the drum. The main dome—12.40 meters across—sits on four squinches, while the three-bayed, portico covered by a flat-topped vault and two domes on pendentives is supported on four stone columns with stalactite capitals. Though new, the portico is classical in its character. With its tall polygonal shaft and stalactite-decorated balcony consoles, the minaret has an equally authentic form.

The Pertev Paşa (figs. 6-7) in İzmit (1579-80), possibly the handsomest vizier’s mosque Sinan built outside of Istanbul, has a large square hall extended longitudinally by vaulted recesses at the back. The 16.70-meter dome that surmounts it is girdled by a drum with twenty-four windows and reinforced by eight flying buttresses, one at each corner of the tall octagonal platform. This platform has bulging squinch conches on the diagonals, and in between these, triple windows inside arches. Lower down, the walls of the mosque contain four two-tiered windows on the east, west, and south, but only two casements on the north. The latter open onto the inner portico which is covered by three domes flanked on each side by flat-topped vaults. The vaults sit on walls with arch openings at the ends, and the domes are supported by four columns with stalactite capitals in front. The columns of the eleven-bay-wide and three-bay-deep outer portico, on the other hand, are topped by chevron capitals all around.

The Sultan Selim mosque (figs. 8-9) in Karapinar (ca. 1567) is a totally symmetrical building with fine proportions. The 14.80-meter dome towers over cut-stone walls that are divided into three receding stages. At the lower level, each wall is reinforced by abutments at the corners and in the middle. On top of these,
they decrease in thickness to form a low upper zone. Above this comes another
low stage with shaved corners that functions as a platform for the dome bolstered
with double flying buttresses on the diagonals.

The minarets of the Sultan Selim mosque are elegant specimens of Ottoman
classical architecture. Their bases rise to the cornice level of the portico; the height
of their pedestals corresponds to the second cornice of the hall; their balconies lean
on beautifully carved stalactite corbelling; and their polygonal shafts are
terminated with traditional pencil-point lead caps.

In front of the minarets, the portico composed of five domes, each 3.60 meters
in diameter and all of them of equal height, rises above two-center arches springing
from six marble columns with stalactite capitals. Over the two-toned depressed
arch of the main door there is a shell design framed by a thin band of dainty
triangles. It is made of ash-gray marble which is also used for the mihrab, minbar,
and muezzins’ gallery. In all these ornamental features a simple taste dominates
the design.

After serving for twenty years as beylerbeyi (governor-general) of Anatolia,
Cenâb Ahmed Paşa died in Ankara and was buried there; a mosque (figs. 10-11)
was built next to this tomb, for which he had left a bequest. It is a sturdy mosque with thick walls constructed of yellowish cut stone containing three tiers of windows: four casements each on the four walls, five above these except on the façade, and two more at the third level on the same three sides. In addition, there are sixteen windows cut into the drum of the 13.90-meter dome which sits on grooved squinches inside.
The odd features of the mosque are the extra large minaret base and the uneven spans of the three-arched portico. The first required that the windows on the west be pushed toward the south; the second produced an asymmetrical portico for no obvious reason.

The Husrev Paşa mosque (fig. 12) in Van (1567-68) was almost destroyed during World War I. The portico and medrese rooms surrounding the courtyard in front of it collapsed, but the 13.30-meter brick dome on squinches remained intact. Sturdy walls (1.60 meters in thickness) finished with striped courses in brown and yellow stone were damaged but survived. Then in 1968 the pious foundations cleared the debris around the mosque, restored its walls and windows, rebuilt the missing flying buttresses on the drum (there are altogether sixteen buttresses alternating with the windows), insulated the dome and repaired Husrev Paşa’s tomb which stands next to the mosque on the east. The mosque is now in good condition.

Figure 10:

Figure 11:
In analyzing these seven mosques one finds that the Edirnekapi Mihrimah Sultan and Sokollu mosques in Istanbul are not only well-designed buildings but they are well built and decorated. Their scale and proportions are pleasing, and their ornamentation follows the norms of the Ottoman classical style. The two mosques located in Edirne and İzmit fall into the same category of good Ottoman classical taste and practice.

Of the three Sinan mosques in the eastern provinces of the Ottoman empire, only the Sultan Selim mosque conforms to classical stylistic requirements; the Cenabî Ahmed Paşa displays an asymmetrical plan and faulty proportioning and the Husrev Paşa an abundance of regional features. Ali Salîm Ülgen attributes the clumsy architecture of the Cenabî Ahmed Paşa to a local architect working from Sinan’s drawings. He contends that such simple mistakes would not have been made by an architect trained in Istanbul under Sinan.10 I tend to agree with Ülgen’s contention. In fact there should be no argument regarding Husrev Paşa’s supervising architect: he had to have been a local master, for only a local master could have produced a classical Ottoman mosque with such strong regional accents.

In conclusion one can say that the Ottoman classical style lost more and more of its essential characteristics and elegance as it moved further and further away from the capital. Supervision was inadequate in the distant provinces and regional conventions in ornamentation were superimposed on the classical framework with little concern for stylistic integrity. In the sixteenth century, Ottoman architecture was still an individualized art form in which design and execution were parts of the same process.

Sinan formulated the principles of Ottoman classical architecture and standardized its parts. Despite the standardization, however, talent played a key role in architectural creation. Those buildings designed and built by Sinan or by his gifted apprentices in and around Istanbul invariably turned out better than those designed by Sinan but built by his less talented subordinates.

Only the key decisions concerning the design were taken in the central offices; these included the diameter of the dome, the transition system, and the thickness of the walls. Most everything else had to be decided and devised on the construction site by the supervising architect. My study on the probable design system of the Karapınar Sultan Selim mosque11 showed that once the supervising architect, with the help of some rope and a few stakes, outlined the circumference of the main dome and drew the walls that supported it, he had at his disposal all the dimensions needed for the floor plan, the sections, and the elevations. The building took form on the construction site under the direction of the supervising architect who played the major role in the formation of the architecture.
Notes

1. A marginal note with the Hijra date 952 indicates that this register was written in 1525 or earlier. See Zanf Orgun, “Hassa Mimarları” in Arktet, 12 (1938): p. 333

2. Ibid.


4. In addition to the court architects in Istanbul, all major cities in the Ottoman empire had resident provincial architects. The provincial architect was appointed by an imperial decree on the recommendation of the qadi who was responsible for municipal affairs as well as being the chief administrator and judge of a city. For detailed information on Ottoman “provincial architects,” see Dr. Rifat Özdemir, “Osmanlı Döneminde Dini ve Sosyal Yapıların İnsası ve Tamiratı Üzerine Bazı Bilgiler” in TAC Vakfı Yayını, no. 6 (July 1987): 23-29.

5. The uninscribed Edirnekapı Mihridah Sultan mosque is customarily dated between 1562 and 1565. However, in view of the registration of its foundation deed in 1570-71, the mosque and the medrese surrounding its fountain courtyard may well have been completed in the latter part of the 1560’s.

6. The Defterdar Mustafa Paşa mosque remained a ruin from the time its dome collapsed in the earthquake of 1751 to the last quarter of the nineteenth century, when it was covered with a wooden dome. Between 1953 and 1962 the pious foundations restored it to its original condition.

7. Second Vizier Pertev Mehmed Paşa died in 1572 and was buried in the rectangular tomb Sinan built for him in Eyüp. The mosque in Izmit was erected after his death by his trusted steward Sinan Kethüda. See Abdüllahad Erdogan, “Kanuni Süleyman Devri Vezirlerinden Pertev Paşa’nın Hayati ve Eserleri” in Vakiflar Dergisi, vol. 2 (Ankara, 1942), p. 235.

8. Ground was broken for the uninscribed mosque in 1566, while Selim was governor of Karaman province. It was probably completed soon after he became sultan on Süleyman’s death.

9. With its dodecagonal cap, trefoil arches, and carved decoration in the regional style, the tomb bears no relation to an Ottoman classical building. It was obviously the work of a local master.


11. See my “Mimar Sinan Yapısi Karapınar II Selim Camiiinin Proporsiyon Sistemi Üzerine Bir Deneme” in Communications Presented to the Eighth Congress of Turkish History (Ankara, 1970), vol. 2, pp. 711-16
CHAPTER 3

Geometry and Memory in the Design of the Madrasat al-Firdows in Aleppo

Yasser Tabbab

The existence of principles and theories common to all Islamic architecture cannot be assumed or taken for granted, since Islam, unlike most religions, placed very limited demands on its architectural production. In fact, even the existence of such commonalities for specific periods in Islamic architecture is impossible to sustain without a careful examination of the major monuments, types, and forms of the given period and the various factors that may have led to their shaping. Some of these factors—materials and indigenous tradition, for example—are regional and contribute to the creation of a local style; others—such as scientific knowledge, theological discourse, and architectural revivals—often cross local barriers and lead to the formulation of a period style. It follows then that our search for principles and theories in Islamic architecture should proceed cautiously from the specific to the general, while taking into account those factors which seem to unify the architectural production of the period under consideration.1

This paper explores two possible ways—geometry and memory—through which medieval Islamic architecture may have created and perpetuated its forms and types, thereby achieving a measure of similitude and coherence. Dealing with two seemingly unrelated and somewhat opposed concepts—the one scientifically precise and the other poetically ambiguous—demands some justification. I did not do it simply to be provocative but because I believe that both of these factors played an important role in medieval Islamic architecture. In the first place, it has been frequently suggested that Islamic architecture and decoration from the eleventh century onwards were characterized by a strong reliance on geometric principles, ranging from simple grids to harmonic proportions.2 As such, geometry may have contributed to the codification and dissemination of architectural ideas in a medieval world that was otherwise noted for its disunity. In the second place, there is an emerging notion that the many petty and grand dynasties that reigned in this middle period often attempted to model their government and institutions after the great Islamic or pre-Islamic dynasties which preceded them.3

By memory I mean two related things. I use the term to refer to the images and recollections of ancient buildings which find their way into the collective consciousness of a culture, either as a mythical building or as an ideal type, and emerge reinterpreted at different times in the evolution of that culture. In this case memory ameliorates historical dislocation.4 I also use memory to refer to a more immediate process, namely the imagery used by medieval poets and other men of the word to describe significant contemporary buildings, often stressing their most unusual forms. Standard and repetitious as much of this poetry is, it is nevertheless an untapped source that may have contributed to formulating an impressionistic image of ideal building types and disseminating such images over a wide area.5 In this case memory ameliorates geographical dislocation. Oftentimes, these two
realms of memory are related in that the first provides the original timeless type and the second dresses it in contemporary garb. In other words, the first becomes the archetype (for example, the Dome of Heaven) and the second its Christian or Islamic transformations (the mosaic dome or the muqarnas dome).

I have restricted my field of investigation in this paper to the Madrasat al-Firdows, an important theological college in Aleppo, and a few other related monuments of twelfth- and thirteenth-century Syria. After dealing with the geometric properties of its plan and elevation, I consider next the evocative and associative qualities of one part of it in connection with extant or archetypical monuments of the distant or near past. I hope that this discussion of the largest and most important monument of medieval Syria will lead to a better understanding of medieval Syrian architecture and its role in medieval Islamic architecture.

Geometry

The Madrasat al-Firdows, built in 1235 by the queen regent Dayfa Khatun, is situated in a southern suburb of Aleppo, a location which allowed its builder to develop his plan freely without any physical restrictions. Seen from a nearby minaret, it looks like a massive block of hewn stone whose severity is only partly relieved by the undulating profile of its eleven hemispherical domes (fig. 1). Whether standing in the middle of its courtyard or viewing it from above, one immediately senses a regularity and proportion that is often missing from medieval Syrian architecture (fig. 2). This feeling is further reinforced when we look at the courtyard in plan; seemingly a square with a rectangular peristyle within in it. That is perhaps the extent of what the eye can readily perceive; but there is much more.

The precision of the courtyard design led me to search for the unit of measurement (the cubit) that may have been employed in its planning. It turned out to be approximately 43.5 cm, which is considerably smaller than the fifteenth-century Persian gaz (60-70 cm), but it seems to work in this building and others in the region. The inner square, which measures 2173 m per side, becomes very

Figure 1: Aleppo, Madrasat al-Firdows, 1235. Aerial view from southeast.
approximately 50 cubits per side. The open courtyard (13.10 m x 16.45 m) gives 30 x 40 cubits, or a ratio of 3:4, making it a perfect 3-4-5 rectangle, or a rectangle made of two Pythagorean triangles. The span between the columns is approximately 10 cubits, although there is a slight diminution from south to north. The internal iwan, measuring 8.72 x 9.60 m, yields 20 x 22 cubits (fig. 3).

**Figure 2:**
_Aleppo, Madrasat al-Firdows. Courtyard from above._

**Figure 3:** _Aleppo, Madrasat al-Firdows. Ground plan with grid. (Redrawn with changes from a plan by the Director General of Syrian Antiquities.)_
With this central core established, it is possible to generate much of the plan, either by measuring off distances on gridded paper (I used a 5-cubit grid) or by means of the compass. The compass method proved a little clearer, so it was the one I used (fig. 4). My procedure was as follows:

1. A circle of 25 cubits radius was drawn and divided into four quadrants by perpendicular lines intersecting at its center.
2. A square was drawn at the points of intersection; this is the inner square of the building.
3. Four circles (all radius 25 cubits) were drawn with centers at the four points of intersection of the perpendicular lines.
4. A larger square was drawn tangential to these four circles. This square very closely matches both the three exterior walls of the building and the back wall of the iwan.
5. The location of the rectangular peristyle within the inner square was determined on the gridded paper at 10-cubit intervals.

This simple process gives us the three exterior sides of the building, the inner square, the peristyle with exact locations of the columns, and the interior iwan. The northern end of the building does not seem to have been generated according to the same proportions. Removing it from the plan makes the central building a perfect square (100 cubits per side) with an interior square exactly half its linear dimension (50 cubits per side) but one quarter its area; the domed parts of the building are located in the space between these two squares. In other words, although this is a one-iwan plan building, it is based on an underlying design of the four-iwan plan or at least the principle of cross symmetry. The fact that only one side of the building contains an iwan and the three others are covered by domes has more to do with the functional requirements of the building than with its
underlying design. Such an adaptation of the four-iwan plan is peculiar to Syria and Egypt, but is nonexistent in Iran.8

Geometric proportions based on an identical cubit also existed for the elevation of the courtyard. The height of a column from the raised platform to the top of the capital is 4.35 to 4.40 meters or 10 cubits; that is, the height of the column is equal to the distance of the intercolumniation (fig. 5). This design method brings to mind the middle-Byzantine practice in planning the so-called quincunx churches, where the height of the column is also equal to the intercolumniation or the diameter of the central circle.9

![Figure 5: Aleppo, Madrasat al-Firdows. Proportional relations in courtyard elevation.](image)

The Madrasat al-Firdows is not alone among twelfth- and thirteenth-century Syrian monuments in having geometric relationships in its plan. Indeed, the bimaristan of Nur al-Din in Damascus, dated 1154, contains even more obvious, if perhaps cruder, use of geometry.10 Here it seems that the generative unit of the plan was the length of the square vestibule, which is slightly more than 5 meters. Dividing it by 10, one gets a cubit of slightly more than 50 cm. Constructing a grid of 5 cubits per side, some other dimensions fall in place (fig. 6). The façade of the building, which once extended further to the right, conforms exactly to the grid line. But more interestingly, the courtyard fits almost perfectly within the grid and measures slightly under 30 x 40 cubits. That is, it is a 3-4-5 rectangle, just like the courtyard of the Madrasat al-Firdows. But these seem to be the only proportionate parts; the exterior of the building is rather irregular.

A number of conclusions can be drawn from the analysis of these two medieval Syrian buildings. First, a cubit measure was used for the better buildings, measuring either 50 cm or 43-44 cm.11 Second, these buildings conform to a square grid made of multiples of the cubit. Third, a generative unit seems to exist in some of these buildings: the vestibule in the Bimaristan al-Nuri and the column height in the Madrasat al-Firdows. Fourth, the 3-4-5 triangle was used as a planning unit for the courtyard in both buildings, and perhaps others. This is of course an ancient ratio which is thought to embody ideas of harmony and perfection. Finally, it seems that many of these centrally planned buildings were designed, perhaps even built, from the interior to the exterior. In both al-Firdows and the Bimaristan al-Nuri, the regularity of the interior can be contrasted with the irregularity of the exterior.
Figure 6: Damascus, Bimaristan al-Nuri, 1154. Ground plan. (Redrawn with changes from a plan by the Director General of Syrian Antiquities.)

Memory

Despite the inner regularity of the Madrasat al-Firdows, its northern section is both irregular and obtrusive. What was this part? What was its original appearance? And how was it related to the rest of the building? If we were to suggest that the design of the main part of the building (an inflected four-ewan plan) was within the domain of the architect, within whose domain should this accretion be placed? I think, by default, it must have been a requirement of the patron of the monument, Dayfa Khatun. The question is, then, what did she have in mind when she commissioned this addition to the pristine design of the madrasa?

As it stands today, the northern part consists of a large iwan flanked by two much later residences that completely hide the original appearance of the building except for a portion of one of two arched openings that once led directly to the courtyard (fig. 7). Actually, these modern residences were built up against two units with courtyards which may have served as residences for the madrasa. This iwan, partly blocked by a low wall, looks out onto a scene of decay and devastation common to many neglected lots in the Middle East.

According to Sibt ibn al-'Ajami (d. 1479) the northern iwan faced a walled garden with a pool whose waters were piped into the madrasa. Using this brief information and the present situation of the building, we may reconstruct the northern part as a large iwan flanked by two smaller iwan entrances and two two-storied residential units, all facing a walled garden with a large pool. To my knowledge, no other medieval madrasa has such a structure appended to it and only one, the madrasa al-Mustansiriyya of 1242 in Baghdad, has an external iwan.

Some parallels, however, can be found in contemporary secular architecture, of which more examples are preserved than is generally believed. Our reconstruction
in fact greatly resembles a little-known building in Mardin called al-Firdows (fig. 8). I have suggested elsewhere that this was the sole survivor of a group of garden pavilions (jawasiq [pl. of jawsaq] according to Ibn Shaddad) erected by princes of the Artuqid court between 1240 and 1260 on their property east of Mardin. It stands today as a rectangular building consisting in plan of a large central iwan flanked by two smaller ones, each with its own salsabil whose waters empty into the large pool in front. The cubit size used in plan and elevation is 44.5 cm, which is very close to that at the Firdows in Aleppo.
Pavilions fronted by a large reflecting pool have a long history in Islamic architecture, and the form may ultimately be related to such Sassanian iwans as Taq-i-Bustan or even the Arch of Ctesiphon. The earliest Islamic occurrence of this type is in the famous Hayr al-Wuhush (wild animal park) built by the caliph al-Mutawakkil (ca 860) just south of Samarra. The centerpiece of this vast enclosure was a pavilion (jawsaq) which faced the legendary Birkat al-Mutawakkil, exquisitely described in the long poem by al-Buhturi. We gather from his description and others that the pool was a square around 200 m on a side, into which water poured from the mouths of animal- and bird-shaped fountains made of precious materials.

There are at least two other palaces in Samarra, the Jawsaq al-Khaqani and the Balkuwa, with external iwans overlooking a body of water, in this case the waters of the Tigris. The plan of the Balkuwa with its adored iwans—one facing the courtyard and the other facing the Tigris—seems to have inspired the similarly situated eleventh-century Ghaznavid palace at Lashkari-Bazar (fig. 9).

Figure 9: Bust, Lashkari Bazar, 11th century. Ground plan. (From Grabar, Alhambra, fig. 71.)

The fame of these pavilions and palaces was spread by the poetic descriptions of the ninth- and tenth-century Baghdad poets al-Buhturi and al-Sunawbari and found a receptive ear among the later poets of Sicily and North Africa, such as Ibn Hamdis, Ibn Khafaja, and many others. It is perhaps through these poetic evocations that the essential conception of the Hayr al-Wuhush reached these regions, where, not surprisingly, we find a number of very early examples of the Samarran prototype. In Madinat al-Zahra, the tenth-century caliphal foundation outside of Cordoba, the basic module of a rectangular pavilion with a colonnaded porch facing a large pool is used in at least two of the main public buildings of the
palatial city (fig. 10). Moving to central North Africa, we find other variations of this prototype in the eleventh-century Qal'at Bani Hammad (fig. 11) and in the Ashir palace of the Zirids.
Coming back to the Madrasat al-Firdows, we may therefore suggest that its northern part was inspired by the distant memories of the great jawaqaqs of Samarra and by their more recent transformation in different parts of the medieval Islamic world. Its vast iwan served most likely as a summer audience hall with a pleasant view of a well-watered garden and a distant prospect of the mighty citadel of Aleppo, much like the iwan of Qasr al-Firdows caught glimpses of the Mardin citadel through the foliage in its courtyard garden.

**Firdows and Paradise**

The image of Paradise occurs most obviously in the naming of the Madrasat al-Firdows, a very uncommon name for a religious institution. But it is reinforced by two subtler means. The first is the northern end of the madrasa with its iwan and garden combination, a type which, as we have shown, dates back to the early Islamic and even Sassanian periods and which may have paradisical associations. The second lies in the lengthy inscriptions which form a long band across the eastern façade and another around the courtyard. It would take another paper to deal thoroughly with these astounding inscriptions, but two small portions are particularly noteworthy. Just above the portal are Quranic verses (6:85 and 12:4-6) which promise true believers that they shall enter Paradise where they will be served on plates of gold. All around the courtyard is a long inscription which, using poetry and mystical language, describes the activities of the Sufis who gather in this madrasa, saying at the end that their reward is nothing less than a vision of God’s face, a hearing of His voice, and a drink from His cup. In other words, through their spiritual exercises, the Sufis of al-Firdows would reach a state when they become worthy of the Divine Presence, or of Paradise on earth. An image of this Earthly Paradise was in reality appended to their very place of worship and meditation.

This paper has illustrated the role of geometry and memory in one example of medieval Islamic architecture. Despite the lure of geometry, especially for an underdeveloped field like Islamic architecture, it has demonstrated that geometry was not the sole determinant in design, and its rules were sometimes bent or even superseded to accommodate the functional requirements of the building or the vision of the patron.

**Notes**

1. This approach greatly differs from that taken by various architects who have dealt with Islamic architecture, including Nader Ardalan and Laleh Bahktiar in *The Sense of Unity* (University of Chicago Press, 1973) and Gulzar Haider, *The Touch of Midas*.

3 The Buyids, perhaps more than any other dynasty, displayed such revivalistic tendencies. See for example, Herbert Busse, "The Revival of Persian Kingship under the Buyids," in D S Richards, ed, Islamic Civilization, 950-1150 (Oxford: Cassiter, 1973), pp 47-70


6 Ernst Herzfeld, Matériaux pour un Corpus Inscriptionum Arabicarum, pt. 2, Syrie du Nord Inscriptions et Monuments d’Alep, 3 vols (Cairo: Institut Français d’Archéologie Orientale, 1956), 1/2, p 300

7 On the Timurid gaz, see Bernard O’Kane, Timurid Architecture in Khurasan (Pasadena, Calif: Mazda Publishers, 1987), pp 34-37

8 See Ernst Herzfeld’s perceptive remarks about the differences between Syrian and Iranian architecture, in "Damascus: Studies in Architecture III," Ars Islamica 11-12 (1946): 35-38

9 See, for example, H von Hallensleben, "Untersuchungen zur Genesis und Typologie des ‘Mistratypus’," Marburger Jahrbuch für Kunstwissenschaft, 17 (1969): 105-18

10 This monument is briefly discussed in Ernst Herzfeld, "Damascus: Studies in Architecture I," Ars Islamica 9 (1942): 4ff But he does not deal with its geometry.

11 The smaller cubit actually seems to be far more common in thirteenth-century Syria and Jazira where we find it used in the Qasr al-Firdows at Mardin (see below) and the Binmaristan al-Kamili in Aleppo.

12 "Les Iresos d’Or" de Sibt Ibn al-‘Ajami, Jean Sauvaget, ed (Beirut: Institut Français de Damas, 1950), p 80

13 Yassef Tabbaa, “Towards an Interpretation of the Use of Water in Islamic Courtyards and Courtyard Gardens,” 7/iii (July-September, 1987): 197-220

14 For illustrations of these two monuments, see Roman Ghishman, Persian Art The Parthian and Sassanian Dynasties, 249 B.C - A.D 651, (New York: Golden Press, 1962), pp 136-37 and 193 ff Referring to Taq-i Bustan, Ghishman said, "We probably have here the central elements of a triple iwan, apparently never completed"

15 This park is located and tentatively reconstructed in Ahmad Sousa, The Irrigation System of Samaria during the Abbasid Caliphate (in Arabic), 2 vols (Baghdad: al-Ma‘arif Press, 1948-49), vol 2, pp 298 ff


17 According to C E Bosworth in The Ghaznavids Their Empire in Afghanistan and Eastern Iran, 994-1040, 2nd ed (Beirut: Librairie du Liban, 1973), p 137, “the running of the [Ghaznavid] palace ... was organised on lines reminiscent of earlier Islamic courts and, ultimately, of the Abbasid court in Baghdad"

18 Tabbaa, “Use of Water,” passim

19 These are illustrated in John Hoag, Islamic Architecture (New York: Abrams, 1977), figs 85 and 86
20 Ibid, figs 76 and 80

21 I shall take up this issue and others related to the al-Firdows in a forthcoming monograph
CHAPTER 4

The Function of Decoration in Islamic Architecture

Lisa Golombek

"Decoration," as defined by Roger Scruton in The Aesthetics of Architecture,\(^1\) is a component of "architectural detail," along with moldings, color of fabric, texture, solids-and-voids, and, one might add in the case of Islamic architecture, muqarnas. He points out, however, that of these components of detail, only decoration (i.e., ornament) has meaning outside the architecture. Ornament is that which can stand alone and have meaning beyond the architectural context; it is governed by its own set of laws and practices. Thus, we exclude those elements that evolve in the design of the structure itself and are part of the making of the architecture, however much they contribute to the aesthetic impact. We also leave aside the role of decoration in communication in order to focus on its aesthetic function.

It would be naive to suppose that architectural decoration consistently performs the same function in a given society, or even in a single building. Two recurrent phenomena, however, have been observed which, although they do not explain everything we want to know about the aesthetics of decoration, can help us perceive some common traits in Islamic buildings.

Symmetry

The first has to do with symmetry. Symmetry is one of the basic principles of design, particularly in the Islamic world. Whether in the development of pattern or in the composition of a façade, it relies on the recognition of like parts balancing each other on opposite sides of a fulcrum or axis. It can be used to focus attention on a vital part of the architecture, such as a doorway, which becomes the axis of the symmetry. The exterior of the Seljuq tomb tower at Demavand is divided into eight vertical panels, one on each side of the octagon (figs. 1-2).\(^2\) These panels are then subdivided into three rectangular zones in which different sorts of patterns are worked in brick revetment. One of the facets of the octagon is pierced by a rectangular door, over which are two lobed niches, followed by a square panel similar to those on the flanks.

At first glance, this appears to be a symmetrical composition, with the doorway facet as the central axis. Both diamond grid patterns of the lower flanking panels have deep furrows which cast heavy shadows. Both middle panels are relatively flat, with a subtle diamond pattern. Both upper panels have linear patterns with vertical and horizontal lines as well as diagonals. These panels develop a bilateral symmetry around the axis of the doorway through matching of textures, smooth with smooth, rough with rough.

Upon reflection, however, we come to realize that the symmetry is imperfect. From among the six panels, no two are alike. Both lower panels have designs
based on a diamond grid, but on the left it is the grid which lies in shadow; on the right the grid is in relief. The middle panels follow the same pattern as the lower ones but with fewer bricks removed. Again the difference between right and left is similar to that of the lower panels, but reversed. The right panel’s grid is in reserve, while the diamonds on the left are outlined. Thus, diagonal axes of symmetry are created. The uppermost patterns are dissimilar: the left is a large eight-pointed star, the right a cross formed from four lozenges. But between them is a panel that combines both themes, the cross in the center, the stars around. The symmetry of the upper zone is therefore accomplished only through the participation of the axial
Panel Thus the panels relate to each other in ways that are more subtle than perfect symmetry, that is, an exact repetition of elements. The linkage created circumscribes the doorway and criss-crosses in front of it.

Early Timurid monuments provide many examples of this phenomenon. At Turkestan Timur built a shrine at the tomb of Ahmad Yasavi which took the form of a huge rectangular solid (fig. 3). The exterior, with the exception of the entrance which was never finished, is entirely covered with glazed brick patterns. The decoration forms a membrane, encasing the solid in an apparently uniform cloth, a point to which we shall return. On closer inspection, however, we note that the two sides have been covered with similar, but not identical, geometric designs (fig. 4). Why would an architect not use the same pattern on both sides?

Figure 3: Turkestan, Shrine of Ahmad Yasavi, 1399. View from rear.

Figure 4: Turkestan, Shrine of Ahmad Yasavi, 1399. Schematic drawing of geometric tile designs along north and south exteriors. (After Man'kowskaia.)
At Timur’s palace, the Aq Saray, the colossal gate had two flanking towers (fig. 5). From a distance, their glazed tile decorations set on the bias appear identical. But again, two different patterns have been used (figs. 6-7). At Turkestan the variant symmetry may not have been so apparent because you cannot see both sides of the building at once. Here, however, the towers were intended to be viewed together. Does this not seem to violate the principles of symmetry in architecture? Perhaps, but one may also take the point of view that the designs are identical because their primary grids are the same.
The Textile Metaphor

I spoke a moment ago about decoration as a “membrane” or fabric encasing the body of the architecture. Some years back I tried to demonstrate the impact of textiles on Islamic art in what I called the “draped universe.” In architecture, for example, a textile inspiration could justifiably be sought for glazed or unglazed decorative brick work, known in Persian as hazar baf, “a thousand-weaves,” for the screens of intersecting arches at Cordova, and for the lace-like stucco “dripping” from the walls of the Alhambra. Embroidered or tapestry-woven bands which were so popular from the ninth to the twelfth century inspired historians like Maqrizi to use the term tiraz to describe the inscription bands skirting the stone façades of Cairo.

Taken further the textile analogy can be used to differentiate between approaches to decorating. In the Jami‘ of Yazd the interior of the dome chamber is entirely covered with designs of glazed tile, beginning with the dado of turquoise hexagonal tiles up to the cosmic image in the dome (fig. 8). The decoration either frames and draws attention to movements in the building, such as openings, alcoves, transition zones, niche hoods, and so forth, or it defines the separate parts of the construction and emphasizes the important ones, or is involved in plays on symmetry, as we saw in the tomb tower. From this very lavish interior, one derives a sense of horizontal layering, a clear definition of zones—the dado, and its association with man and earth, the vertical supports which have the most intellectually challenging images, and finally the transition to the heavens. Like a tailored garment, with its fitted sleeves, nipped waist, and collar, this decoration is adapted to its separate parts. Every transition is defined by a border and a new pattern, designed to fit the new shape. These revetments span several decades, from the 1360’s to the 1430’s, but the aesthetic remained consistent.
Contemporary with the last stage of decoration, the same patron, Mir Chaqmaq, constructed a large mosque in the suburbs (fig. 9). Inside the dome chamber the atmosphere is totally different. Glazed tile is kept to a bare minimum, the dado and balustrades. The mihrab has a tiled hood but its heart is of carved stone. The rest of the chamber was whitewashed. It was not a question of economy, for other buildings from this moment until the end of the century in the Yazd region adopt this aesthetic. The whitewashed walls cast a pall over the entire space. Like the costume on a Greek statue, or the untailored Arab robe, the abaya, the whitewash
picks up light and shadow, revealing, as it were, the shape of the body underneath. The only decorated part, the dado, like hemline embroidery, defines the edge of the structure.

The draped look does not require that applied decoration be eliminated. If we look again at the Turkestan shrine (fig. 3), we see that glazed tile was used extensively, but it falls freely over the volumes. The pattern of the textile-like hazar baf decoration does not accommodate to doors and windows. Rather, doors and windows are “cut out” of the fabric. Nor does the decoration reflect the complexity of the two-storied interior. A large naskhi inscription in glazed brick runs the length of the building, as if it were a tiraz band on a large curtain.

The draped mode enjoyed popularity in the Timurid period because architects wished to bring out the volumetric qualities of the exterior. At Timur’s mosque, the Bibi Khanom of Samarqand, the dome chamber of the sanctuary is fronted by a colossal portal with flanking minarets, like the palace gate which we saw earlier. The juncture of these towers with the sides of the dome chamber is very complex, but the sheath of hazar baf decoration makes it visually exciting (figs. 10-11). The geometric patterns permutate from surface to surface while retaining the same orientation. Facing surfaces, such as are found in the corner, are treated as a single folded cloth. Again, the inscription band ties together the ensemble.

Figure 10: Samarqand, Masjid-i Jami of Timur (“Bibi Khanom”). Exterior flank of sanctuary (1398-1405).

Thus we have two modes of architectural decoration corresponding to the two major types of costume in the medieval Islamic world, the free-flowing Mediterranean draped robe, and the fitted or tailored garment characteristic of the Iranian and Central Asian world. I do not wish to imply here, however, that these modes coincide geographically with the distribution of garment construction. By the twelfth century anyway, both types of garments were worn throughout the Islamic world.
The foregoing examples have all involved tiled decoration. Does the textile metaphor work with stone architecture? Many of the Mamluk buildings in Cairo have stone façades decorated only with carved tiraz bands. In some, the inscription bands emphasize the separate parts, but never reach the extremes of the fitted look of glazed-tile decoration. The façade of the Qala‘un complex in Cairo would be an example of draped surface, the inscription band of which moves in and out of the solids and voids along its length (fig. 12).
The two modes can be seen, side by side, in Seljuq Anatolia. The portal of the Karatay madrasa has well-defined spandrels and lintel. But the portal of the Ince Minare at Konya is unlike anything else (fig. 13). It is not divided into the usual nested frames. Nor do its inscriptions serve as frames or dividers of horizontal zones. The scheme begins to make sense, however, if one applies the textile analogy. The outer frame resembles a curtain, drooping in the center, as often shown in thirteenth-century illustrations from the Maqamat. The inscription bands run vertically down the center like the two edges of the abaya, decorated with their tiraz bands. One could even imagine the lateral ornaments as applied braid, terminating in tassels.

Figure 13:
Konya, Ince Minare, 1258.
Portal. (After Seher-Thoss.)

The same two contrasting approaches to decoration can be found in the stone architecture of Mughal India. In the sixteenth-century tomb of Humayun at Delhi, the architect emphasizes the many facets of the complex exterior by framing important parts in white marble. These frames are then subdivided several times and their compartments filled with geometric and other designs. In the other great Mughal tomb, the Taj Mahal, the applied decoration is lavish but subdued, hardly visible from a distance, leaving the general impression that it, too, has been draped in white, like the interiors at Yazd.

What accounts for the textile analogy? Is it simply a useful metaphor, or is there some basis for it in theory or practice? Finally, can it be related to the principle of imperfect symmetry noted earlier?

In our discussion of symmetry, we referred to the existence of a primary grid that underlies all decoration and remains visible, to some extent, in the final product. I would like to suggest that this subliminal grid is related to the
orthogonal grids used by Islamic architects to design their buildings in elevation as well as in plan.

The primary grid, which assisted in the design and construction of the building, survived as an “after-image” and became the starting point of all decoration. From this point the decorator could move in various directions. He could circumscribe and isolate the significant features, doors, windows, and transitions, utilizing the grid to draw frames, compartments, and filler for these compartments. Each section would then have imposed on it secondary and tertiary grids which gave to the section a certain uniformity. Permutations of the grid would not void the sense of symmetry, and architects played with these permutations to strengthen symmetry, as in the Demavand tomb tower.

The orthogonal grid in which straight lines intersect at right angles is, of course, the grid of the loom, from which even the most elaborate of textiles must be generated. Thus the imaginary grid could have suggested a textile itself and led the architect to treat the building as an object to be covered, or dressed. This attitude might extend to the nature of the decoration itself, such as hazar baf brick work or, in the Alhambra, to the hanging of curtains of plaster lace, or, in the Safavid mosques of Isfahan, to the hanging of tile patterned silk.

The beautiful Lutfullah mosque combines in a single space the tailored and the draped look (fig. 14). Each syllable of the architecture is clearly pronounced through moldings and decoration. Cable moldings surround the eight supporting arches, like the piping of an upholstered chair. But the decoration itself is draped over large areas of transition, for example, the onset of the lunettes under the arches which would normally be treated as a separate unit. There is no octagonal squinch zone, at least not one suggested by the top.

Figure 14:
Isfahan, Lutfullah Mosque, 1617. Interior. (After Seher-Thoss.)
Notes


ARCHITECTURE
BASED ON
ISLAMIC
THEORIES
Astronomical and Cosmological Symbolism in Islamic Patterns: The Objectivity of Sacred Geometry

Keith Critchlow

As the subject of today's discussion is design or geometrical principles within Islamic art and architecture, I would like to begin by reminding you, if I may, because I came to Islam through Plato, that Plato provided a very interesting triad of positions that can be taken to approach any subject, ways of knowing, one might call them. The first is the orthodox position. It is represented in most of us by the authority of our religion. But then there is something in all of us that feels the need for criticism and skepticism; these are of course what modern science depends on. Now these two attitudes, the authoritative and the skeptical, on their own set up a polarity which is almost impossible to resolve, as Plato tells us many times, unless a third "mean" position is found. That third position he posits is contemplative and "mystical," a word that has in this instance nothing to do with mystification. The mystical I suggest is the basis of all scientific validation. Why would a scientist go into his laboratory to discover something if he knew it already? He goes there for what he doesn't know. That's a very simple definition of the acknowledgment of the mystical position. Science arose to solve mystery. This third viewpoint is one that is inclusive and says both the other positions can be true and, of course, this is the paradox and is the very quality over which the computer fuses out. The computer can't deal with ambiguity. It can only say yes or no very fast. It is therefore diadic and useless when confronted with "maybe."

What stems from this is that we can then talk about intelligence in different ways. The intelligence of the mind or the cerebral intelligence, we have no reason to consider inferior or superior to the intelligence of faith unless taken alone. But there is also another level with which all contemplatives are acquainted, and that is the intelligence of the heart. It is this intelligence which, I believe, operates in the master craftsman, which is one reason why he or she is not necessarily very verbal, or inclined to word explanations, and therefore the reason why there is traditionally no "art history" in Islam as a separate theoretic study and why we have so few documents left demonstrating the intellectual reasons for the structure and measuring of Islamic design principles.

The jurist Ibn Arabi, the contemplative thinker—I didn't say Sufi, because some people here might not accept the term—has been a great inspiration to me. I came to him through Nader Ardalan's book, which was also my introduction to Islam. Ibn Arabi suggested that cosmology had to be equally an interior truth and an exterior truth. Coincidentally there is a modern school of philosophy which has grown up within the last couple of years, that affirms Bishop Berkeley's position that the universe doesn't exist unless we are there to observe it. Ibn Arabi was no fool. To that he most likely would have said, they are reciprocal. We have to observe the universe to maintain its existence; at the same time, our existence is completely dependent on the universe. Yet both are dependent on the Creator. In
his cosmogony Ibn Arabi attributes symbolically the differentiation which is the root of the existent order to the disequilibrium that lies between the angle of spin of the earth to the sun and the angle of spin of the whole solar system. As a philosophical proposition this is not unlike that suggested by Albert Einstein, who said that if pure space and time had no rupture there would be no material existence. Einstein talked about existence in terms of "knots" tied in space and time.

According to Ibn Arabi, the disequilibrium that gives rise to the existent cosmos can be considered to arise in the direction of spring equinox in the constellation we call Aries. First of all, he said, there is a sphere of potentiality, the sphere-limit of all space. That does not conflict even with modern cosmological theory. A finite amount of energy matter is as true for a traditional perspective as it is for a modern one. We might say that the universe is finite; so thereby is the sphere of activity. Differentiation takes place as expansion. Thus disequilibrium arises as a consequence, according to Ibn Arabi, and is expressed within our solar system, as this is our perceptible universe. The first creative evidence is the rhythm of expansion and contraction. When day and night expand as far as they can until they are equally long they produce the principle of the equinoxes at the spring and at the autumn. When the days and nights are as short as they can be in relation to each other, we see the principle of contraction, the contraction of daylight at the winter solstice and the contraction of night at the summer solstice. That is the shortest day in winter and shortest night in summer.

From these four poles in the limit sphere as direction, that is Aries in the spring, Cancer in the summer, Libra in the autumn, and Capricorn in the winter, of our universal space, indicates Ibn Arabi, we next can appreciate the motion of the Divine Intellect which sets up the conditions for the creation of the manifest world.

We moderns tend to believe, because we are brought up under a particular perspective, that cosmology is something out in space, but for the contemplative, cosmogony, or the birth of the cosmos, as well as cosmology, is something within us. Whether we talk about our power of reason or our sense of realization or of perception, we confirm within ourselves that what we are touching or believe we are touching corresponds to an image of that thing within us. Whether we talk about our power of reason or our sense of realization or of perception, we confirm within ourselves that what we are touching or believe we are touching corresponds to an image of that thing within us. I don’t want to get into philosophical hair-splitting. What I’m saying is that the traditional perspective held by Ibn Arabi is of an inner cosmos that has to correspond to an outer cosmos. The former—the cosmos within—is a psychospiritual cosmos—as is ultimately the cosmos without.

To return to the expansion, this gives rise to a polar reaction, which is contraction. This is the cross of the year or the solstices and equinoxes. Aries is
igneous, or fire, which is hot and dry; it is balanced by Libra which is of the quality of air that is hot and humid. The contractive reaction to this polar expansion gives rise to the contraction of the night at midsummer symbolized by Cancer and the contraction of the day symbolized in midwinter by Capricorn. This is a cosmology based on the qualities of experience and the directional fact of the heavens as well as on the essence of human life—that is, the contraction and expansion that constitute the life rhythm of human breathing.

In Ibn Arabi’s cosmogony the threefold action of the Divine Intellect creates the further eight directions making up the twelve constellations in the limit sphere. There is an interesting parallel to this in the Platonic succession represented by Plotinus, who talked about the act of the Divine Intellect in three simultaneous aspects or phases. For Ibn Arabi the Divine Intellect proceeds away from its origin to a point where it reaches its absolute limit, fixes on the principle of maximum expansion, and then returns to its origin. Plotinus would have called this the principle of proceeding, maintaining, and returning, the function of the spirit that is simultaneously coming into being, preserving being, and returning from being. It is quite an awe-inspiring concept. From each of the first four poles of the year and their directions, we see how the three fire signs are set up from Aries to Leo to
Sagittarius, and the other Air, Water and Earth triads accordingly. When this in turn explains the symbolism of the zodiac, we can see why in contemporary astrology (which is almost a travesty of spiritual astrology) the cardinal sign is so called as it is the initiating sign, proceeding trian-gularly it reaches Leo, which is the fixed sign of the fire signs, it then proceeds to Sagittarius. We can take this as “medieval symbolism” and dismiss it, or we can consider what Ibn Arabi is saying: that all human experience, bar ultimate union, is symbolic and that all he is offering is an allegory or a “likely” story, yet a responsible “likely” story. 

I find it interesting because Ibn Arabi was called Ibn Flatun, son of Plato, and Plato also said that his cosmology, the Timaeus, was only a likely story. (Likely does not mean probably here, but the result of this world being a “likeness” to the perfect model in the absolute domain.) Maybe all cosmologies can only be “likely” stories? The fact that astrology has got into such a wobbly state in modern times because it tends to reinforce the individual and accidental should not blind us to the fact that it did and does have for certain people with a certain perspective very profound psychological and spiritual meaning. The two polarities, solstices and equinoxes, and the major triads of air, earth, water, and fire set up a twelvefold geometry which corresponds, according to Ibn Arabi, to a symbolic understanding of how the cosmos presents itself to the human perception through the actions of sun and moon. The sun moves through the sky and completes its cycle in twelve months. There are twelve months because the relationship between the sun and the moon marks out the sky in twelve intervals. Each new moon marks the next monthly interval.

One influential writer on Islam today is a Swiss gentleman by the name of Frithjof Scuon. Among his writings he has pointed out that the very worst thing one can accuse a modern Western human being of today is being naive, but that says Scuon from a traditional perspective is our natural condition. I rather like that. We stand in the center of our own cosmos; there is nowhere else we can stand and experience things except from where we are. Is this naive? We can make the effort to place our viewpoint elsewhere, but that is both difficult and/or dangerous as it is an abstraction and fundamentally untrue. We are where we are.

In the Holy Quran there is a passage that says something like “We shall show them our signs on the horizons and within themselves, until it be clear to them that He is the Truth.” This is precisely what Ibn Arabi talks about when he says that cosmology is an exterior perception and an interior psychological and spiritual reality, both reflecting the unitive truth. There is a geocentric view and an anthropocentric view, yet one reality. We all know, because we are all very wise moderns, that the sun is in the middle and everything is going round it, but I challenge anybody in this room to say that he has proved this by his or her own observation. It is, in fact, an act of faith in modern instruments. Has anybody ever really looked at the sun and had the experience of its being still and he or she going around it? Does not the sun rise and set each day? Ibn Arabi says we do not need to have an either/or cancellation of one of these two facts. The human-centered view and the solar-centered view are both true. This is the paradoxical mode. But the geocentric view confirms that we are at the center of our own experience. We are not on the sun.
One of the important things I learned when I was first introduced to Islamic thinking by S. H. Nasr was that “conclusive” does not necessarily mean “exclusive.” That is something we perhaps still have to learn in the West, where the conviction remains that because one thing is true, another view of the same facts has got to be false. There are cases where psychologically something is “false” and mechanically it is “true” and visa versa. A series of objects go around the sun, and something called gravity holds them all together. But that is not what we experience, and it is not what any human being has ever observed. Empirical means, “of the senses, as observed by and verified by the senses.” This heliocentricity cannot be observed and verified by the unaided senses. However, not to over-labor the point, we have Titus Burckhardt taking an interpretive view of the tradition: “Mankind is the privileged bearer of the intellect and therefore may know essentially all that is. The traditional perspective places man at the center of the visible world, which corresponds to immediate sensory experience.” It is a huge act of common sense. If we observe the planets in the sky from where we are, whether we have a telescope or not, we see that they make very weird backward movements and loops—that is the very reason why they are called “planets,” a word said to be derived from the Greek word for “wanderer.” There has been a lot of discussion as to how much ancient civilizations knew about these strange eccentricities. As far as Plato was concerned, these points of light in the sky were “the gods” and the gods, certainly for him, did not behave irrationally. They are there to communicate with us. They communicate with us in geometry, and that is the geometry they communicate with us. They communicate with us in geometry, and that is the geometry they surround us with. This is the geometry of the cosmos—in time. What Plato said in the Timaeus is this: “to describe the pattern of movements (the “choreography”) of these gods, their juxtapositions, and the backcircling and advances of their orbits on themselves is to tell which of the gods come into line with one another at their conjunctions and which of them are in opposition and in which order and at which times they are in front of others. Sometimes they are screened from our view only to reappear again, thereby bringing portents of things to come to those who cannot reason. To tell all this without [using] models would be labor spent in vain.”
The next initiatory sign is Cancer which 'descends' to the place of Scorpio, 'expands' and fixes from Scorpio, to establish the 'return' at Pisces. This is the aqueous ternary.

The polar pair on the contractive axis of four tendencies of the universal nature (ta-tabl'ah) to Cancer is Capricorn representing the position of the winter solstice. From the initiating position Capricorn 'descends' to the ternary Taurus, which in turn fixes the possible 'expansion' to Virgo, which in turn becomes the point of return to the origin in Capricorn.
The relation in right angles necessarily denotes contrast as it is opposition.

The qualities of the twelve zodiacal 'mansions.'
I am most surprised that Platonic scholars have not caught on to what Plato is actually saying here. Plato’s Academy is most unlikely to have published that work or taught astronomy without models. What I would like to propose to you is that Islamic art preserved these models, and still preserves them. The limitations are within ourselves if we can’t see what Islamic art is and has preserved. That is why Islamic art as a vehicle for the revelation that is Islam is governed by such stringent rules. However it carries perennial and universal truths and these are completely Islamic in format—a fact that can be demonstrated in many different ways within the visual conventions. But the geometry that lies behind and within it is preserved from an earlier time because it is the “geometry of eternity.” None of Aristotle’s illustrations seem to have come down to us, and none of Plato’s either but, as he says himself, how would Plato have taught these things without illustrations?

Let us now look at the objective facts of our visible universe.

If we were able to take a time exposure over the course of an entire year, we would obtain images of the line-trace of the planets against the background of the constellations. The only organization currently charting these things and publishing them every year is the Rudolf Steiner observatory in Switzerland—in some people’s minds that is enough to write it off, but please don’t jump to unconsidered conclusions as the facts are empirically scientific. You would see that the first time in this particular year Mercury actually goes forward and then backwards again is in the constellation of Taurus. The next time that Mercury stops, goes backwards, and then goes forward again in the same year is in the constellation of Virgo. The third time that Mercury, the god of communication in ancient Greece, will do this “choreography” is in Capricorn. So every year Mercury makes a threefold loop series or triangular pattern around us on earth and the nearest point of each loop to the earth can be described by another triangle. The precession means that it is slowly going to move right around the system until it has made twenty-two such loops before returning to the same position in the Zodiac.

People have often said to me, how do you know that this kind of information was known by Muslim astronomers or designers, and the answer may be that we have evidence of it already being recorded in book form in 635 A.D. in China, and no doubt in Islamic manuscripts yet to be published. There is a remarkable consistency in the geometry the planets form around us on earth. In the same way that we have inherited the system of the twelvefold division of the heavens from ancient Babylon. This is not surprising as it is based on a demarcation made by the sunrise each lunar month.

In Iman Ibn Arabi’s emanational theory, through the principle of correspondences, each of the various planetary skies “housed” the archetype of a different prophet. Saturn was the “house” of Abraham, Jupiter was the “house” of Moses, Mars was the “house” of Aaron, the sun the “house” of Enoch, Venus was the “house” of Joseph, Mercury was the “house” of Jesus, and the moon was the “house” of Adam. It follows, in this theory, that the “heavenly spheres” or enveloping spheres of planetary movement housed archetypal principles that in one of their modes can be characterized as prophets of spirituality and thereby relate to the “guides” of humanity.
Iman Ibn Arabi’s insight is taken from the unitive point of view where inner and outer meet. Hence from this viewpoint of the Unity of existence the heavenly lights become guides as to inner realities. So the heavens decorated with lights are

Here we represent the sixty-year cycle of conjunctions between Jupiter, Saturn and the Earth, which is central. Three times during this sixty-year cycle, the two outermost visible planets Saturn and Jupiter are seen together in 1901 in the constellation of Sagittarius, in 1921 in the constellation of Leo, and in 1941 in the constellation of Aries; in 1961 they return to the constellation of Sagittarius. An enneagon or nine-pointed star is made up of three equilateral triangles.

The path of Saturn plotted in time to the nine positions of conjunction over the sixty-year period mark out a nine-pointed star of approximately seven-year intervals.

wonders for humanity to penetrate through contemplation. Through the principle of correspondence we find a new significance in the meeting of planets as they symbolize the meeting of Prophets. If we take one such cycle of conjunctions or meetings of, say, Jupiter and Saturn we see how their sixty-year cycle works over time. Jupiter and Saturn met in 1901; they met again in 1921, and again in 1941, and back to the starting area in 1961. Al-Findi regarded this sixty-year cycle as one of the most fundamental cycles in Islamic astronomy.

If we trace directly the way Saturn moves through these conjunctions and “time” relationships, we see that it forms a nine-pointed star. In my book, which some of you will know, I have put forward a thesis regarding one way Islamic patterns are constructed, and that is by taking the half-way point of the line of a polygon, and putting in an over and an under crossing point, a diad, on this midpoint. If we now take a specific pattern and set this up, we have three twelve-sided figures meet on an equilateral triangle so that they touch exactly in three places a nine-sided figure which is floating in the center of that equilateral triangle. Whether we regard this as being unconscious—the result of the inner contemplative practices of craftsmen—or whether they were displaying facts of the
In the nature of two-dimensional space lies a series of immutable reflections of archetypes of space. One such set is the relationship between twelve and nine in the set of duodecagons (12's) centered on the points of main equilateral triangle $A B C$. They each contact exactly on an edge $D E F$ the three sides of an enneagon or nine-sided figure (central); the residue spaces $G H I$ are inverted hexagons of six sides. All these polygons have the same edge length.

universe as conscious deliberation is not so important as the fact of the analogical correspondence. What we have between the twelves and the nine-sided figure is a hexagon which is turned inside out to complete the fitting family of the three figures. I suggest, and that is all I can responsibly do, that the nine refers to the time cyclic relationship between Saturn and Jupiter, and the twelve to the zodiacal background "totality." It is a possible synthesis; whatever else, it displays the symmetrical archetypes that correspond.

I get very excited when I look at an Islamic pattern. I find nothing less profound than Bach’s *Art of the Fugue* in it. The mathematics of beauty has reached precisely the same degree of profundity. It can elevate the soul because it is a recognition of inner facts of the created order. What is interesting about this actual pattern in Persia is that the master mosaic artist has placed a “perfect” pentagon inside every five-pointed star, which I have been told represents the human being, whether there are three “arms” or five, the heart is the same. That is the ingenuity of the artist, speaking an intensely felt language through the objectivity of geometric symmetry. It is no wonder that for Islam Art and Science were never separated; it is even more a paradox that there was never an art history for Islamic art, only an art practice. Maybe their wisdom lay on the one hand in “the eye down onto the heart,” as August Rodin described the artist’s mode, or on the other hand in the patterns of symmetry which are themselves as timeless as the atomic molecules which have maintained their form from the beginning—thank God.

To conclude I would propose that Islamic pattern and its co-necessary neighbor and consort Islimi (arabesque) are together a route to the Unity of existence and both represent a path of understanding that leads from complexity and multiplicity through the mystery of symmetry back to unity. It is a celebration of the created order yet leads the mind back—through Beauty to the one beside which there is no other.

Notes
CHAPTER 6

Some Evolutionary and Cosmological Aspects to Early Islamic Town Planning

Ibrahim Allawi

The object of this paper is to investigate the relation between two currents in early Islamic town planning and architecture and to assess their influence on later Islamic artistic activity and urban form. Attention will be focused on the two main town-plan types, the Kufa model and the Baghdad Round City, that exemplified the two currents; on their relationship to the society that produced them; and on the transition from one type to the other.

But first a few words ought to be said about the evolution of Islamic culture and the place of astronomy and geometry in that evolution. The view expounded in this paper is at odds with that expressed by historians of Islamic architecture who hold that Islam was born in a cultural vacuum. Although representing a radical departure from the previous course of Arabian history, Islam in many ways continued practices that had evolved in Arabia in ancient times, particularly during the last phase of the neo-Babylonian expansion.

Free city-states flourished in ancient times. Their economy and their culture were based on maritime trade. Contrary to conventional views, the sea rather than the desert was the axis around which ancient Arab history revolved. This fact is well attested by modern archaeology, and explains the important place astronomical and astrological lore had in ancient Arab poetry and the vivid references to the sea in the Quran. This maritime orientation of the ancient Arabian city-state required the astronomical knowledge and mathematical skill necessary for navigation. Geometry governed ancient South Arabian art and architecture long before the birth of Islam.

After Hellenistic times and with the expansion of maritime trade, the free city-states in Arabia reached new heights in their culture. They developed a highly articulated art, architecture, and urban form. But when maritime trade passed into the hands of the Greeks and Romans it cut the lifeline of the pre-Islamic Arabian city-states. Most of them ceased to exist in the fourth or fifth century A.D. Mecca was the exception. It emerged as a center of international trade at a time when most Arabian city-states had already disappeared, and it soon became the center of religion and culture for the whole of the Arabian peninsula. This helped pave the way for Islam. The Quranic designation of Mecca as um al-qura is significant, for it was then the Arabian metropolis.

Seen in this light Islam represents the historical phenomenon of a city-state transformed into a world power, a process neither new in history nor unique to Arabia, as witnessed by Athens and Rome—only two among many other cities that became centers of great empires. What probably distinguishes Islam is the suddenness and explosive consequences of the process; it took place within the span of a single generation. Amidst this rapid upheaval there was no room for the gradual revolution of art and architectural forms. They had to be adopted from traditions handed down from the immediate past, and when these traditions could
no longer meet the needs of a vast centralized state, new forms had to be invented or borrowed from others.

Cultural borrowing is not a linear process. It usually involves separating the borrowed objects and forms from their historical evolutionary context and adapting them to new needs without regard for the specific conditions that originally gave rise to them. Indeed many forms borrowed by Islam came from traditions different from those in which Islam was born, and most of the areas conquered by Islam were already seats of developed centralized kingdoms. From the contrasting and interactive processes fusing the traditions of the Arabian city-states and the newly born Islamic world state emerged Islamic art, architecture, and urban form.

How this took place can best be shown by comparing and contrasting the two models already mentioned, Kufa and Baghdad. The case of Medina is too complex to deal with here.

**Kufa: The Model for an Open City**

In many respect the early planning phases of Kufa reproduced the Mecca type of city plan. The Mecca plan in turn represented a long evolution and displayed the following elements:

_A haram._ The word _haram_ meant a religious sanctuary and therefore a safe refuge for all those in danger. Its high spiritual standing gave it greater importance than city walls. This is probably why Mecca was an open city, as were several other pre-Islamic city states. Describing Petra and other Nabataean cities, Strabo says that they were "without walls on account of the peace that prevails among them." One could also cite other examples, particularly those mentioned by Arrian and the city of Hera in Iraq. Kufa inherited the haram from this Meccan model, which might explain why many people regarded Kufa as the fourth sacred Islamic city after Mecca, Medina, and Jerusalem.

_A geometric plan._ The whole plan is generated from a single center with a symbolic form. The surrounding agglomeration takes the shape of a revolving square, reflecting the center. In this we can see the source of many later Islamic art motifs and architectural forms. The hexagonal arrangement, which we will meet later, may belong to earlier times and can be seen in some ancient decorations and literary traditions.

_Orientation._ The whole plan was oriented according to the cosmos. In the case of pre-Islamic Mecca, the spring equinox, symbolized by the location of the Black Stone, dictated the orientation. The apparent deviation of the present location of the Black Stone from its original orientation can be explained by the precession of the equinoxes. If this deviation is accurate, then the original orientation may have been effected in Hellenistic times.

_A market._ Last but not least, the whole structure of life in the city, including its religious rituals, was centered in the marketplace. In Mecca the markets were located around the Ka'ba and close to the Haram. The development of the market was the most prominent feature of pre-Islamic and Islamic urban form, and it is from the markets that Islamic cities drew their sustenance when the central power declined and the state was dominated by a military slave caste.

All these features of the Meccan plan were adopted in two successive phases of
planning that made Kufa the first and foremost center of Islamic civilization before the foundation of Baghdad. These phases were as follows:

Phase 1. The square system. This system has a square as its central unit, with four surrounding square units. From the arrangement of these five units a whole series of religious, military, and urban formations were derived. The system of the *akhmas* (fifths), on which early Islamic encampments and cities were modeled, is only one of them. It is formed by extending the outer sides of surrounding squares until they meet. The new shape would represent two units, an inner and an outer square. The corners of the two squares are joined by diagonals, thus forming five units, a central square surrounded by four equal polygons.

When the central square in the *akhmas* system is doubled, we get the system of the *cashar* (tenths). This has two adjoining squares as its central unit surrounded by eight or more units. Sometimes the central nucleus is formed by two intersecting squares having the shape of an octagonal star from which the surrounding units radiate, as was the case in the early Islamic camps and in Kufa.

Tabari records the special arrangements of the first Islamic camp at Sharafi, the site of the new Islamic tactical organization, on the eve of the Qadissiya battle. It is of great interest because they were carried out before the Islamic conquest of Sassanian Iraq, and therefore could reflect Islamic planning forms before they were influenced by conquered countries.

The system of *'ashar* (tenths) was known to have been adopted during the Prophet’s lifetime. The method of planning is inferred from later references to how Kufa was planned. First, four arrows were fired from the chosen center in all four directions, beginning with the qibla, that is, the azimuth of Mecca. Then the central square was allocated to the Masjid al-Jami and the command headquarters. The army was placed on the four sides according to a carefully thought-out tribal distribution. The octagonal scheme of Mecca was automatically generated by this simple procedure; the same procedure, only on a much grander scale, was followed in the first phase of Kufa in 637.

The much disputed schemes of the *akhmas* and *'ashar* were obviously two aspects of the same military system adopted by the Islamic army, a model we may call “Qairawan,” a word meaning camel caravan. In subsequent phases of planning Kufa the same scheme was used, but the tribal distribution differed according to the needs of the moment.

Phase 2: The hexagonal system. This system is known in old Arabic literature as the system of *asba* (sevenths). It was adopted during the time of the second Caliph 'Umar ibn Khattab. It was based on another geometric system with the hexagon replacing the square as its basic unit. The hexagonal system survived even after the adoption of the shape of the quadrangular system embodied in the design of early mosques. The hexagonal system was of very ancient origin, going back to Sumerian times, and was well preserved by the Sassanids at Ctesiphon. It was represented in the seven *kishwars* (climates) mentioned by al-Biruni and Yaqufi. It was also the model for the throne of Khusraw Parviz, the famous *taqdes*, described by al-Thalabi and several other historians.

Most relevant to our subject is that the astronomical tables of Zijji of Fizari were based on this scheme, according to Yaqufi. Fizari was raised in Kufa and was mentioned among the astrologers of Caliph al-Mansur who were entrusted with planning the Round City of Baghdad. Another member of the Fizara tribe in Kufa was mentioned by Biruni as the source of the hexagonal Rose of the Winds (fig. 1a-b). How the actual planning was done is not mentioned in the sources, which
are rather unclear on the subject. A likely method is that they drew a central circle containing the masjid and the qasr and then drew six concentric circles around it, followed by an outer ring of twelve circles, each containing a khitta. The area between the circles was perhaps later divided between the khitta to attain the hexagonal form (see figs. 2-3).

The importance of the hexagonal system in town planning is well recognized in

\[\text{Figure 1a:} \quad \text{Biruni's "Rose of the Winds." This diagram shows both the hexagonal and the quadruple orientations. The hexagonal system is represented here by the sunrises and sunsets of summer and winter and by the north-south axis. Biruni, al-Athar al-Baqiya, Bib. Nat. arabe 1489. (Reproduced by permission of the Bibliothèque Nationale, Paris.)}\]

\[\text{Figure 1b:} \quad \text{The quadruple orientation relating the corners of the square (al-arkan). Biruni, al-Athar al-Baqiya, Bib. Nat. arabe 1489. (Reproduced by permission of the Bibliothèque Nationale, Paris.)}\]

\[\text{Figure 2:} \quad \text{Planning of the asba' (the seventh) of Kufa. The seven circles represent the center and the six circles of the innermost ring (al-batina). The spaces between the circles could have been used as rubbish dumps (kunase). The twelve circles of the outer ring represent the new quarters of the city (al-kharija).}\]
modern urban-settlement theories.\textsuperscript{7} Reviewing these theories, Peter Hagget and Richard J. Chorley say, "Hexagons are the regular polygon which allow the greatest amount of packing into an area consistent with minimizing movement and boundary costs," and conclude that "hexagons may therefore be thought to be latent in most human organizations, but only through appropriate transformations of geographical space . . . is their form likely to become apparent."\textsuperscript{8} It is quite surprising, therefore, to find this frankly hexagonal system well developed in early Islam. But, as already mentioned, it perhaps derives from indigenous pre-Islamic Arab traditions mentioned in several ancient Arab sources,\textsuperscript{9} as well as the general familiarity with that system in Sassanian times.

The adoption of the hexagonal system for the regional organization of the Islamic state can be inferred from the organization of the Islamic regions (\textit{amsar}) into a central region surrounded by six provinces, carried out by the second caliph, `Umar ibn Khattab. The seven amsar were Medina (as capital), Sham (Syria), Egypt, Bahrain, Basra, Kufa, and Jazira. It is significant that `Umar's successor Caliph `Uthman ratified seven versions of the Quran. The seventh region, Jazira, has been identified as upper Mesopotamia, but a more likely candidate is Jazirat al-Arab, the Arabian peninsula. This arrangement reproduced on a grander scale the plan of Kufa, as did the military organization of early Islam. However, this flexible geometrical scheme was soon abandoned, and the quadrangular principle regained its ascendancy in town planning, architecture, and patterns. Later on, the quadrangular and the hexagonal system were followed by a new type of spatial organization.

\textbf{The Astronomical and Astrological Basis of the Round City Plan}

The foundation of Baghdad in A.D. 762 by Caliph al-Mansur marked a turning point in the development of Islamic society from dependence on military expansion and tribute collection to investment in private plantations, urban development, and industrial production. Such an orientation motivated research in ancient sciences, technological innovations and patronage of arts and crafts, and encouraged the translation of foreign literature and the making of new discoveries.
A whole new outlook was manifested from the early days of the Abbasid state toward commercial expansion and keen interest in the development of the world market.

On a loftier plane the new outlook expressed itself in imperial grandeur, glorification of power, and a tendency toward cosmic kingship. Capitalist thriftiness, cultivation of knowledge, and undisguised faith in astrology were the marks of the Abbasid age. It is important to keep this in mind in reviewing and analyzing the design of the Round City of Baghdad.

The shift of the capital from Kufa, where the Abbasid caliphate was proclaimed, to Baghdad was more than a change of place. The new capital was to be the embodiment and the final triumph of the idea of imperial metropole as opposed to earlier evolutionary urban forms. Baghdad was conceived to be the center of a world empire of power and commerce, and the navel of the whole cosmos.

Once Baghdad's foundation was decided, the process of organizing the project itself became a motive force for the formation of the new outlook in Islamic life. It is said that al-Mansur assembled an army of 100,000 laborers, builders, and craftsmen from different lands and specializations before embarking on the project. More relevant to our theme is the team of astronomers, astrologers, and muhandisun to whom was entrusted the design of the city and the execution of the work. Translations of Ptolemy's *Almagest*, Indian astronomical treatises, and Persian manuals were ordered by al-Mansur.\(^\text{10}\)

The whole design of the Round City of Baghdad is based on an astrological scheme. To attempt an explanation of its intricate conceptions would call for a technical treatment and some familiarity with Islamic astronomy and astrology, subjects still unfortunately unintelligible save to the initiated few and historians of science. Yet such an approach to the subject is unavoidable if the discussion is to go beyond the statement of mere hypothesis.

The design of the Round City cannot be separated from astrology. It was visualized as a grand cosmic astrolabe, not only to register the position of the planets but also to set a historical benchmark from which to date great events. We must begin therefore by studying Baghdad's horoscope, before we can start to discuss the architectural features of the plan (fig. 4).

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Figure 4:
The Baghdad horoscope as reconstructed from data reported by Biruni, Ibn al-Faqih, and Tanukhi's summary of the Kitab al-Uluf of Abu Ma'shar.
A copy of the actual horoscope drawn in the days of al-Mansur was preserved by Biruni, but copyist errors left some of his planetary positions incorrectly fixed (fig. 5). These errors can now be rectified by the data found in Ibn al-Faqih, and confirmed by modern computations of planetary positions given by B. Tuckerman. In the horoscope, the ascendant—that is, the intersection of the ecliptic with the local eastern horizon—is quite unusual. It was chosen to coincide with the celestial longitude of Baghdad. The latter was measured from the mythical city of Kandakes, which was taken as the meridian. Kandakes, which is supposed to have been located in eastern China, performed the role for old Persian and early Islamic astronomy that Greenwich performs today. The longitude of Baghdad west of Kandakes was given by al-Tanukhi’s summary of the Kitab al-‘Ulf to be 7 hrs. 36 mins. When multiplied by 15, this would give 114d, or 246d from the point of the vernal equinox, or 6d 0m = the ascendant of Baghdad.

Other sources give different, but unfortunately incorrect, figures, particularly the data given in the various manuscripts of Abu Ma’shar’s maddhal. However, the celestial longitude of 246d is confirmed by Yaqut, who gives the distance between the “face” of Baghdad and the azimuth of Mecca as 117d. This figure equals the distance between the position of the sun (Ω 8d 10m) and the ascendant as fixed by the Baghdad horoscope (6d 0m).

From this arrangement the local mean time measured from Kandakes becomes the foundation hour for the city. This seemed to have been done so that the computations of the millennium could be measured from the Baghdad foundation date, as this coincided with the vernal equinox. This fact was emphasized by al-Biruni when he quoted the details of Baghdad’s horoscope. He says, “The astrologers need to know such time and date by [for] fixing the conversions, termination, cycles, and measurements (tasiyyrat) from that time in order to determine the destiny of its people.”

We are fortunate in having a summary of the works of Masha’llah, one of the chief astrologers of al-Mansur, published by two prominent historians of science, Kennedy and Pingree. The relevance of this work to the foundation of Baghdad seems to have been overlooked by its two editors, however. They say that Masha’llah’s chronology depends on a universal rather than a conjonctural
theory, and the intervals that Masha’allah gives are all from the midpoint of the millennium of the moon to a particular event. This may be so, but a simple calculation will show that Masha’allah, or the team of astronomers and astrologers of al-Mansur, had initiated a new epoch different from the Zoroastrian chronology, from which to date important events. The reason for that was that the foundation of Baghdad coincided with the fifty-third year of the greatly dreaded millennium of Mars in the Zoroastrian chronology, so a more auspicious chronology had to be derived to accord with the aspirations of al-Mansur and his declared wish to have his descendants rule for eternity.

The fact that Masha’allah had shifted his chronology upward by a millennium is noted by Pingree, but he attributes it either to error or to “someone’s desire to transfer the responsibility for Ahriman’s assault from the Sun to the evil planet, Mars.” But such abscission of Ahriman would hardly be logical in view of the fact that Masha’allah’s purpose was “to confirm the Islamic rather than the Zoroastrian or Mazadean revelations.”

The synchronization of the new chronology was perhaps done by Masha’allah, possibly in collaboration with Nawbakht, whose works are now lost. This synchronization could, however, be inferred from other evidence. The new cosmic chronology was probably based on the number of “world days,” using a parameter of millions of days, rather than thousands of years, as in the Zoroastrian chronology. Its great innovation was to use the date of a city’s foundation as “zero day,” and to reckon from it the number of days past and future.

Such a system was used in Abu Ma’shar’s Kitab al-Ulaj, where the “world days” were taken to be 360,000y x 365.259 days = 131,493,240 days. When one million days is taken as a unit of chronology, it fits quite well with the date of Baghdad’s foundation. The first million days would be 2,737 years before Baghdad, which would fall in the millennium of the Moon in the Balance Constellation according to the Zoroastrian chronology. This was called the “magic ascendant” and Masha’allah placed the ascendant of the Prophet’s birth in that constellation. The second million days before Baghdad’s foundation would fall almost exactly on the date of the Julian period of January 1, 4713 B.C. if the year length of 365.259 days is used. This date is still used by astronomers as a chronology for dating certain events independent of months and years. Accordingly the Julian day of Baghdad’s foundation is 2,000,000 plus five days, if we use the year length of Abu Ma’shar, and was attributed to Banu Musa or Thabet ibn Qurra. It is possible that it was taken from an earlier source that went back to the time of Baghdad’s foundation.

The Julian period was chosen by Joseph Scaliger in 1582. It is not clear whether that date was based on Baghdad’s chronology, but it is possible because the meridian of Baghdad was used for 0 meridian in certain astronomical computations in the late Middle Ages. On the other hand, some sources say it was based on the number 28 x 19 x 15 = 7,980 years. If this is so, then the latter figure is close to 3 million days before Baghdad’s foundation.

The Baghdad Horoscope

The prototype for Baghdad’s design belonged to ancient imperial traditions; several cities have already been suggested as its source of inspiration. However, it embodied new concepts in that it followed its astronomical and astrological schemes to great extremes. The date of the Baghdad horoscope given by Biruni is corrected from those of Ibn Faqih, and from the inspection of the original manuscripts, as well as from the modern reckoning given by Tuckerman. Table 1
Table 1

Planetary Positions of the Baghdad Horoscope According to Various Sources

<table>
<thead>
<tr>
<th></th>
<th>Biruni (1)</th>
<th>Ibn al-Faqih (2)</th>
<th>Modern (3)</th>
<th>3 – 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>☉ 8d 10m</td>
<td>☉ 8d 10m</td>
<td>☉ 10d 58m</td>
<td>– 2d 48m</td>
</tr>
<tr>
<td>Saturn</td>
<td>☼ 1d 40m</td>
<td>☼ 1d 40m</td>
<td>☼ 1d 25m</td>
<td>+ 0d 15m</td>
</tr>
<tr>
<td>Jupiter</td>
<td>–</td>
<td>← 6d 0m</td>
<td>← 8d 48m</td>
<td>– 2d 48m</td>
</tr>
<tr>
<td>Venus</td>
<td>☼ 29d 8m</td>
<td>☼ 30d</td>
<td>☼ 2d 58m</td>
<td>– 2d 58m</td>
</tr>
<tr>
<td>Mercury</td>
<td>☼ 25d 7m</td>
<td>☼ 24d</td>
<td>☼ 26d 53m</td>
<td>– 2d 53m</td>
</tr>
<tr>
<td>Moon</td>
<td>☽ 29d 10m</td>
<td>–</td>
<td>☽ 27d 29m</td>
<td>+ 1d 16m</td>
</tr>
<tr>
<td>Mars</td>
<td>☼ 2d 50m</td>
<td>–</td>
<td>☼ 2d 04m</td>
<td>+0d 44m</td>
</tr>
<tr>
<td>Dragon’s Head</td>
<td>√ 25d 0m</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Dragon’s Tail</td>
<td>☽ 25d 0m</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

shows the planetary positions as reported by Biruni and Ibn Faqih compared with modern computations for 4 Jamadi Awwal/ 31 July 762. The table also shows that the horoscope of Baghdad fits well with modern computations, except for a difference of about -2d 50m in the case of the sun, Jupiter, Venus, and Mercury. It is not easy to comprehend the astrological scheme underlying the horoscope at a glance, however. We see Jupiter, the guardian planet of Babylon and Iraq, in the ascendant, balancing the menacing Dragon's head, while the newborn moon is in maximum latitude, almost perpendicular to the line of lunar nodes. (Space does not allow a full discussion of the scheme.)

There are several versions of the founding date. Biruni’s version, July 23, 762, is correct in fixing the year, but errs in fixing the day. Ibn al-Faqih’s version, July 31, 762, is correct; it has been confirmed by modern computations of the planetary positions. Ibn al-Faqih also provides correct planetary data. Yaqubi gives two different versions, the first in his Buildan and the second in his History; both are wrong, though they probably are important in that they reflect previous attempts to found the city which were abandoned because they were inauspicious.

The hour of the foundation can be calculated in several ways. The first and most obvious way is by the position of the moon. In modern computations this is given as 210d 30m (≈ Ṣb 0;30), July 31, 762. The mean daily motion of the moon is 13.1764 degrees. By a rough guess from the horoscope the time of the foundation would be about eight hours after sunrise. We can calculate the position of the moon by interpolation, which gives 207d 48m (≈ ☽ 27;29) at 13 hrs 57 mins Baghdad time.

To confirm this, one must calculate the hour of the ascendant ← 6;0 using the equation: T = α - t - θ. The equatorial coordinate for 6;0 is 259, as stated by Dastour al-Monajimin (259/15 = 17.25 hrs.), (t) the semi-diurnal arc for Baghdad
= 7 hrs 12 mins, as given by Yaqt. The sidereal hour for July 31, 762, is about 8.54 hrs (time is in decimal fractions measured from noon). 17.25 - 7.12 - 8.54 = 1.96 hr = 1 hr 57 min. Total = 1 hr 57 min + 12 = 13 hr 57 min. This confirms our first computation, without allowing for the correction of time by a few minutes.22

The Architectural Plan

The Round City was designed by the method of stereographic projection of the equator and the Tropics of Cancer and Capricorn. The vertical axis marks the meridian and the horizontal marks the equinocial line (figs. 6 and 7). In this scheme, the palace and its green dome stand at the point of the pole of the universe. On another plane, the different rings of the city plan could represent the orbit of the seven planets, the center being that of the Sun, the king of the universe. This scheme is indicated by the name given to the caliph's palace, Qasr Bab al-

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Figure 6:
Stereographic projection of the Baghdad plan.

Figure 7:
Superimposition of the Baghdad plan on Fig. 6.
Dhahab (Golden Gate Palace). We know from Herodotus and other sources that the various planets were symbolized by various metals: silver stood for the moon and gold for the sun.

If all these features appear to be no more than hypothetical indications of the astronomical basis of the plan, there is other more concrete evidence. This is the arrangement of the streets (sika), which divide the city. Al-Yaqubi gives the following sequences of sika, which is somewhat confused by modern historians who have erroneously interpreted his plan. There are 11 sika between the Basra Gate and the Kufa Gate; 12 sika between the Basra Gate and the Khurasan Gate; 8 sika between the Kufa Gate and the Sham Gate; 9 sika between the Sham Gate and the Khurasan Gate. This yields a sum of forty sika for the four quadrants. A closer look shows that each two opposite quadrants (1+4; 2+3) have 20 sika, which presupposes an arrangement based on an eccentric design. It does not require a great leap of imagination to conclude that this feature is one of the sources of al-zawra, a term for the Round City that means "eccentric," representing the apparent eccentricity of the sun's orbit. The other probable source is the deviation of the Baghdad qibla, which was made to coincide with the orientation of the ascendant of → 6:0.

Biruni gives two methods for the mathematical calculations of the apogee of the sun, or the apparent eccentricity of its orbit (figs. 8-9). The distance of the apogee is given by Biruni24 as 65d 26 m. This is the equivalent of 5d 26m, and is only 34 minutes less than the position of the ascendant in the Round City horoscope. Taking this hypothesis as a starting point it becomes possible to fix the position of the gates of the Round City with more assurance. It also makes it possible to correct the various reconstructions of the Baghdad plan advanced by most, if not all, modern scholars. Figure 10 shows the Round City's plan before the markets were transferred from their original location in the central ring (fasil) around the diwans to the taqat.25 This explanation of the plan gives the position of the Basra Gate, and not the Kufa Gate, as facing the qibla, which coincides with the point of the ascendant at → 6:0. That immediately clarifies the position of the Dar al-Qattan and the covered court used for prayers.

The astronomical explanation of this arrangement can be inferred from the
varying durations of the seasons and of the days, according to the position of the sun’s apogee (*periheion*). At the apogee, the apparent motion of the sun is slow and the days are long. At the perigee, the situation is reversed; then the apparent motion of the sun covers a longer distance in the same period of time. This is expressed by having more streets (*sika*) near the perigee and fewer in the northern and western quadrants, as demanded by the laws of Kepler.

An early Islamic commentary on the Almagest clarified this phenomenon graphically (fig. 11), and a modern and accurate graphical representation is given by Neugebauer. However, the astrological purpose behind the complicated arrangement of the city gates and the *sikas* is not very clear. It could be explained by an important passage in the manuscript of *Dastour al-Monajimin* (fol. 237v) about the theory of cycles (*adwar*) based on the astronomical phenomenon discussed above. Biruni calls the divisions of the apparent solar motion *nitaqat*, which has been translated as "zones or sectors."

Whether these four *nitaqat* are reflected in the arrangement of the twelve *diwans* of administration into four groups is uncertain. However, the order in
which Yaqubi mentioned them suggests that they are (fig. 10). The first group (1, 2, 3), to the left of the Basra Gate, in our scheme would be the diwans of al-Mansur’s sons, of slaves, and of the treasury. The group to the right of the same gate (4, 5, 6) is made up of the diwans of armor, correspondence, and land tax (kharaj). The third group (7, 8, 9) would be those of seals, troops, and provisions; the fourth group (10, 11, 12) those of servants, the public kitchen, and expenditure.

One may even speculate on the particular choice of 40 sikas which would give the 9d sectors of the circle (40 x 9 = 360). Nine can be taken as the number of the planet 7 + 2 nodes of the moon, or the Indian navagraha, or it may be related to the cycle of the Saros, approximately eighteen years.

The architectural evidence for this is well known for the Bab al-Talisman of Baghdad. It was destroyed in 1917, but fortunately it had already been photographed. Willy Hartner remarked that it symbolized “the two dragons which menace the new-born child symbol of the new moon.” Perhaps a more appropriate interpretation is that the newly born moon has mastered the two dragons, thus symbolizing, ironically as it turned out, the freedom of the city from external danger.

The whole architectural arrangement of the city plan shows that it was designed as a strong fortress. Great care was taken to seal off the caliphal palace from the rest of the city. A series of iron gates separate one quarter from the other, and each sika can be isolated by two strong gates. A high wall surrounded by a moat protects the city from the exterior, and the only access is from four gates with slanted openings approached by bridges. Astrology here assumes another function, that of providing the spiritual fortification for the capital to reinforce the imposing material ones. The whole rigid scheme of the Round City is obviously totally out of character, when one considers the relaxed and open pre-Islamic Arabian cities with their flexible structure and capacity for growth and expansion.

The markets were ordered out of the Round City after a revolt of the merchants headed by al-Muhtasab, and not because of the critical remarks of the Greek ambassador. The markets were originally designed to be part of the Round City.
and probably as a sort of protection against political troubles. (This was also the case in Mahdiyya in Africa which reproduced many of Baghdad’s features, if not the round plan, as can be gathered from Yaqt’s description.) Thus it was not surprising that the Round City was soon abandoned by al-Mansur and subsequent Abbasid caliphs. However, even after it was abandoned, it retained its magical standing in the popular imagination. This may explain why many of the social upheavals and protests by craftsmen and artisans were staged to prevent Friday prayers in its mosque.

The Round City’s total disappearance, which remains a mystery, was explained by an astute contemporary observer as the work of Caliph al-Mu‘tadid, who feared that the city was being used as the center for an astrologically determined plot. Al-Tanukhi says that al-Mu‘tadid ordered the great wall of the Round City to be pulled down and, despite strong protests of the Hashimite clan, he permitted anyone who wished to build on it. “Some years later,” al-Tanukhi says, “the ruin of the whole city set in little by little, until it became what it is today.” 30

Baghdad’s fate stands in great contrast to the destinies of the two other Islamic cities in Iraq, Kufa and Basra. They retained their stability even after losing their political status as capital cities. Their decline was the result of the progressive “bedouinization” of Iraq in later times, and not of an act of state.

The decline of the central power in Abbasid Iraq was not simultaneously reflected in the decline of its urban life. On the contrary, the great renaissance of Islamic culture in the tenth century coincided with the decadence of the caliphate and the rise of the slave-soldier caste. This paradox can probably be explained by the nature of the social structure that arose within the framework of Islam.

The markets, rather than the caliph’s palace, became the heart of city life and the dynamic force of growth and renewal. And though the veneer of astrological culture remained, this was only an outward expression of an evolutionary process that was, in some ways, independent of the central power, yet connected with it in other ways. This is well expressed in certain astrological miniatures that were probably painted during the heyday of the Round City. These miniatures are copies of very ancient ones, attributed to Abu Ma’shar, but their prototype can be found in Qasr al-‘Amra from the early days of the Umayyads.

Early Islam had already inherited certain architectural and urban traditions which can be inferred from historical texts rather than from archaeological finds. Archaeological investigation, however, has yet to throw light on these problems. What Islam contributed, particularly during the era of the centralized empires, was an elaboration of those ancient traditions by fusing them with new and varied inspirations and laying them on the solid foundation of mathematics and geometry. We can understand, then, that the complexity of Islamic art and architecture and the special prominence of patterns reflect an underlying geometric system that aims at unifying the various parts into an all-embracing aesthetic whole.

When Islamic culture developed and spread over farflung regions of the world, it retained many of its original forms and features, even when the original substructure and spiritual framework had weakened. One can demonstrate this easily by comparing the architectural monuments of Tashkent, for instance, with those of ancient Baghdad. They show quite clearly the prominence of astrology integrated with architectural forms and geometrical patterns.

The pointed arch was probably developed through an evolutionary process from southern Arabian animal and vegetal forms—horns of ibexes were drawn and sculpted to depict pointed arches as religious symbols. But its later development in Islam reflects the intrusion of astronomical methods of representation and
stereographic projection into the sphere of building and decoration.

Islamic art, architecture, and urban forms first developed under conditions of rapid change and military expansion. Later they became expressions of the newly settled conditions of Islamic social life. The fusion of the various elements of this evolution was not complete, nor could it have been. One can sense the existence of a certain duality in decorative, architectural, and urban forms that may be attributable to the disharmonic fusion of the traditions of contrasting systems: the city-states with their open models of urban planning, on the one hand, and the centralized world empires with their leanings toward astrology and their obsession with the needs of security, on the other.

To be intelligible, those forms have to be viewed in their evolutionary context and in their relation to the contemporary social structure. The duality of early Islamic artistic, architectural, and urban forms is probably an expression of an unresolved social conflict. This is what gives early Islamic culture its richness and what can furnish a key to its understanding.

Notes

4. Tabari, Tarikh al-Rusul wa al-Muluk, ed. M J de Goeje (Leiden, 1897), vol 1, p. 2224
8. Ibid., p. 51
11. Biruni, Athar, p. 271
15. Ibid., p. 73
16. Ibid., pp. 74-75
17. Biruni, Athar, p. 52


24. Ibid., p. 184


26. Fig. 11 is reproduced here from Bodleian ms. Marsh 720, fol. 101v, with the kind permission of the Bodleian Library.


Chapter 7

Islam, Cosmology, and Architecture

S. Gulzar Haider

Architecture is a social act and as such cannot be divorced from a culture’s view of the grand scheme within which it exists. A single building can herald a futuristic vision or mirror an alien tradition, or it can even declare a rebellion against its milieu, but the whole city, the collective architectural will of a society, cannot lie about the belief structure that sustains it. If dwelling is a mirror of self, the city is the landscape transformed by the invisible forces of collective ideas. For Islam no act is free of an ethical dimension, and no domain escapes connection with the sacred. It is for this reason that, for both the study and the making of an architecture for Muslim cultures, we must understand the basic ideational structures of its cosmology, ethics, aesthetics, politics, sociology, and economics. In this paper I will deal primarily with its cosmology, fully aware that when a complex entity like Islam is studied through the filter of one exclusive category, the risk is run of flattening and simplifying reality. Against this I shall seek His protection and the reader’s understanding.

In the classical sense, cosmology is that branch of philosophy which raises questions about the origin and structure of the universe. Though one can find pre-Socratic examples, it is Plato’s Timaeus and Aristotle’s Physics that present the first comprehensive cosmologies. Classical cosmology remained distinct from ontology and metaphysics, which dealt with general features of existence (reality, the natural, and the supernatural), and were not structural in their manner of analysis and presentation. Cosmology was expected to provide a comprehensive framework that could simultaneously elaborate and bring together the empirical fact and the metaphysical truth. The concepts of divine creation, annihilation, miracle, and providence were added to cosmological discussions in the Middle Ages.

Cosmogony is a specific, often dramatic, depiction of the origin of creation. Hidden in the cosmogonic story are hints about how matter came forth from non-matter, how formless emptiness and silence were transformed into morphologically differentiated and complex existence, how elements acquired their attributes, how time came into being, and how various categories attained their mutual stations. Though most cosmogonies are singular happenings free of a historical dimension and of ethical debate, they yield valuable insights when subjected to comparative analysis.

For the present discussion, we might have to abandon these clear philosophical categorizations and declare our interest in a kind of purposeful cosmology, a system of frameworks helpful in locating and charting the paths of man within his perceived and postulated, physical as well as ethical, universe. Such a cosmology can help man structure the questions, if not completely answer them, about the origin, extent, limits, and destiny of the universe, about temporality and eternity, and about the battle formations of good and evil.
It is difficult to imagine a society without some shared cosmogonic beliefs and some collective notions of how the machinery of existence works. In legend—a common medium for expressing cosmologies—the characters symbolize ideal attributes, and events mark the milestones in the unfolding of creation. Systems of religious belief remain the most potent sources of energy for cosmological conceptualizations. A religion in fact survives in the hearts and minds of its adherents because it calms their existential anxieties by making them become aware of their role in the greater scheme of things. Traditionally man has exhibited the tendency to “cosmicize” the part of the world he decides to possess or inhabit. In religious societies, from aboriginal North Americans to classical Hindus, natural phenomena have been given the status of deities, while monotheistic religions have looked upon the cosmos as the wondrous handiwork of God and have treated nature as a treasure chest of Divine portents. In the faith-dominated Middle Ages, the boundaries between astrology and astronomy, between chemistry and alchemy, and between the state of the body and the state of the spirit were at best fuzzy, if they existed at all.

As is evident from the Quran and declarations of the Prophet Muhammad, Islam reaffirmed the essential cosmological framework of the sacred texts and traditions of the Abrahamic faiths. The grand scheme of creation, the orderly and law-abiding universe, the original state of the Garden and the earthly exile of man, the temporality of this life, the eternity of the hereafter, the final judgment, heaven, and hell, all remained essentially the same as they had been in the Judeo-Christian tradition. This is understandable because Islam claimed the unbroken flow of revelation from Adam to Noah, to Abraham, his progeny, Moses, Jesus, and Muhammad. Every subsequent revelation affirmed the ones before, clarified the concepts that had been clouded, reestablished the ones that had been erased, corrected the heresies that had crept in, and refined the law to an ever-increasing level of timelessness. Finally, through the knowledge and wisdom of the Prophet whose legacy is uninterrupted, God made potentially available the deeper and higher mysteries of existence to the seeking man.

For Muslims the Quran is the final and eternally protected word of God to man. Its words are unique and irreplaceable, its structure timeless and fixed. Its meanings unfold as time itself unravels. It yields guidance of eternal relevance through exegesis (tafsir) and deeper interpretation (ta’wil) by those “firmly grounded in knowledge” and the “men of understanding.” Though the Quran is “pre-time” (qadim) and originates from the guarded tablet (lawh al-mahfuz), its content is historically placeable. Though most of its verses can be correlated with historical events that occurred within the twenty-three years of the Prophet’s mission, they transcend history. Though all other created things shied away from receiving the glory of this revelation, it was revealed directly to the soul of Muhammad. It is in this sense that the person of Muhammad is intimately and timelessly interwoven with the Quran. This is why the Prophet, his life, his words, his deeds, his passions, his struggles, his judgments, have become the medium through which the transcendant revelation becomes potentially understandable. As the Quran is perfect and complete, so its human recipient and its social embodiment is the perfect man (insan al-kamil). The paths of all Islamic thought must by necessity converge on the Quran, whose metaphoric manifestation is Muhammad, the “City of Knowledge” (madinat al-ilm). It is significant that ‘Ali Ibn Abi Talib, who was the earliest of the exegetes of the Quran and perhaps the first hermetic philosopher of Islam, and among the most intimate of the Prophet’s companions, is identified as the “gate” to this City of Knowledge. It is little wonder that all paths of Islamic philosophical thought, especially the one seeking.
the esoteric, converge through the authority and elaborations of companions such as ‘Ali and Abu Bakr who were initiated by the Prophet himself.

From all this it is possible to assert that any attempt to grasp the nature of Islamic cosmological thought has to begin by accepting the Quranic cosmogony and to recognize that all creation, with the single exception of man, is endowed with special characteristics (fitra) that makes it fulfill its destined role (amr) within a perfect order. Man is a special creation molded and shaped in the best of orders from lowly clay, yet recipient of the “breath of my spirit.” Only man has been given knowledge and thereby has been made worthy of the honored station of trustee and vicegerent of God.

Man has a primordial enemy, Iblis, the one who refused to acknowledged his divinely appointed station, who plotted man’s exile from the Garden, and who has vowed to lead him away from the path of return. Return is only possible through the willful submission to God and allegiance to the “way of the Prophet,” for in that lies the fulfillment of the very purpose of creation, to give individual and social expression to the ethical order of Islam. It is in this sense that we can understand the Islamic scheme of time and history as the grand ethical divide separating light from darkness, good from evil, the grateful from the defiant, and the God-directed from the self-indulgent. That divide is the Quran and Muhammad, the inseparable and the mutually essential, the logos of Islamic cosmology, the point of reference in the Islamic view of time.

The history before Muhammad, the prophets and texts that preceded him, only partially revealed his attributes. The history after him unfolds only to reaffirm his timeless message and consolidate a global consciousness of man’s ethical destiny. When the Prophet Muhammad uttered the last verse revealed to him: “This day have I perfected your religion for you and completed My favour unto you and have chosen for you as religion al-Islam,” Islamic cosmogony had its final act.

It is little wonder then that the particulars of Islamic cosmological thought have invariably been drawn from Quranic verses and the utterances of the Prophet, especially the hadith al-qudsi. Though the structural influence of Greek philosophical tradition on early Islamic thought is well documented, the content of Islamic thought was drawn essentially from the Quran and the sayings of the Prophet. The Islamic cosmological discourse repeatedly draws upon the verses about the nature of God and His beautiful names (asma‘ al-husna), the creation and adornment of the heavens, the perfection and abject obedience of the heavenly bodies, the plurality of the heavens and diversity of creations, the conscious and unconscious adorations (tashbih) of all creation, the flow of destiny, and the enigma of man’s time and God’s time. Of special interest are the metaphoric illusionary images of the light and the niche, the earth and the throne, the garden of Adam and the promised paradise of the soul contented and at peace, and of course the Night Journey (isra) and the Ascension (mi‘raj) of the Prophet. It is my belief that hidden in the script and the body postures of the pious believer or in the stations of a pilgrim on the hajj, or in the rituals of burial, and for that matter in the singular aloneness of an alif or the dot of a beh, in the sevenness of the heavens, in the twelveness of the months, in the eightheness of the angels that hold the Throne and in the seventeeness of repetitions in the daily ritual prayers are cosmological indications of great value.

It is now possible to identify six concepts that we consider to be essential to any Islamic cosmological construct. The first is the a priori existence of God: the Unseen Omnipresent who engulfs all things, but not in the sense of being alien to them and who is within all things, but not in the sense of being contained by them. This is to accept the being of God (dhat-i Ilahi) even independent of his
attributes (sifat), God in his absolute aloneness, the one who is, even when there is no one to recognize his attributes. This is the essence of his glory (jalal), where all manifestations are annihilated in the dhat, his undefinable reality that is beyond any perception, conception, and even cognition. Unconditional acceptance of dhat-i Ilahi thus becomes the center of any cosmological structure in Islam. It anchors man to his inner self as he stands at the threshold of the vast universe.

Second is the nature of God as expressible through his “names” (asma al-husna). His attributes (sifat) are manifest through the signs and portents (ayat), and those places and events that lead us to his cognizance. He is Jamal, the beauty that signifies the aggregate manifestation of his sifat. He is Nur, the light that is essential for all enlightenment, be it for senses or for soul. He is Samad, the ultimate reference, the one that contains no vacuity and in himself occupies no spaces, the one beyond corporeality. The prime purpose of the cognizance of God through his attributes is for man to recognize his own attributes, potentialities, and limitations, vis-a-vis his God. The asma al-husna constitute a cosmic sphere that bounds man’s search for his station in the universe and establishes his bearings as he seeks the divine purpose.

Third is knowledge, the path as well as the light that illuminates the path between acceptance of God as dhat and the cognizance of his nature, the sifat. This knowledge bridges the directly experienced realm of the present and the manifest (zahir) with the intuited realm of the anticipated and the hidden (batin). The primal source of energy and direction for this knowledge is the revelation from God to the Prophet to mankind. The concept of the book (kitab), though primarily used for the written and spoken word of God, has also been used for nature, from the cosmos to the insects of the earth, whose study is to lead to the cognizance of God and the wisdom of His creative will. Knowledge is also embedded in the very being of man and God-directed discipline (ibada, taqwa, zikr), and self-reflection can lead to intuitive and direct discernment (kashf) of some vignettes of truth. The multiplicity of the sources of knowledge is indicated by the fact that the word ayat (the sign, the portent, the indicator, the evidence, the pointer) has been used for the verse itself, for its meaning, for man and mankind, and the phenomena of nature, and for the process of history and time. Islamic pursuit of knowledge has encompassed a wide range from empirical and discursive to intuitive and illuminational. Putting aside the philosophic categories of the seekers and sources of knowledge, we can assert that the observation and contemplation, the perception and intuition, Aristotelian rationality and gnostic illumination are not mutually exclusive. On the path of knowledge they can in fact be mutually supportive.

Knowledge is the infinite set of paths that lends form to the circumference of the manifest reality (sifat) around the center of the hidden essence (dhat). The center is not a point, as it is neither visible or locatable. The circumference is not a sphere as the radii of knowledge are not identical, nor is it fixed in size, as its limits are in perpetual flux.

The fourth concept is that of order, harmony, and perfection. Creation is not a capricious act of an Olympian god seeking amusement. Nor is it a grand biochemical reaction that unfolds as a stochastic process where every subsequent state is a function of chance occurrences of the previous state. God’s creation is purposeful, and every created entity has a prescribed role that fulfills without question. Man, because of his knowledge and will, has the freedom to recognize or reject and be subservient or rebellious to his purpose. The cosmos is orderly and obedient to the created law, and man is challenged to discover a flaw and point out a disharmony. Man is also informed that the eye of skepticism in search of imperfection will only return tired, dull, and discomfited. Beauty (jalal) is the
state of ordained harmony of entities in their proper relationship to one another. All that corrupts this beauty and disrupts this state of harmony stands accused of sedition (fitna) in the court of the Divine. The order is not static nor is the creation bounded and complete. Instead order is a cosmological principle and harmony its perennial value.

The fifth concept is that of the perpetual, continuous, and involuntary movement of all creation toward its origin in God. All emanates from him and is bound by its very nature to return. In this is rooted the concept of inevitable perishability and mortality (fana') of all existence. All material manifestation and thus all physical beauty are entropic, except the jalal, the glory and majesty, of God. Only the human march in search of God's cognizance is not entropic, and only the soul that of its own will recognizes its Creator and turns toward him can win its freedom from the inevitable decay of the body. Only those who surrender their very being as a testament to his glory transcend mortality.

The sixth concept is that of the continuity, harmony, and unity of all existence. God is the cause of creation, but not causally subservient to it. Since truth (haqiqat) cannot contradict another truth, there cannot be two orders of reality independent from one another. This view therefore seeks the conditions of flux and intertransformability among the finite and the infinite. It aims for balance between discursive thought and gnosis and considers the former to be a precursor of the latter. It respects and gives due place to tashbih and tanzih. It approaches manifest phenomena as shadows of reality because the realm of the senses can only accommodate shadows. This concept upholds that man who is apparently insignificant in the cosmos in fact carries within him the microcosm that dares to comprehend the macrocosm and even God.

It is our assertion that the Islamic view of existence permeated Muslim literary and artistic culture in the past. Architecture, which by its very nature mediates between earth and heaven, became an eloquent medium for this resonance between belief and expression. Under the pretext of building for a purpose, on a site, in a particular climate, using the right materials and the best techniques, architecture in fact served as a medium for expressing the favorite philosophical inclinations of both patron and builders, many of whom were trained in the master-disciple system of the Sufi orders (tariqas). Scattered writings point to the correspondence between Islamic philosophical thought and architectural expression, but serious specific studies are lacking. One building that deserves attention is the Taj Mahal, whose architectural-cosmological significance has barely been studied.

The literature in this field is of three kinds. The first are the historical studies; they focus on problems of dating, precedence, influence, style, technique, and texts that relate the architectural work to its sociopolitical context. The methodology of research and writing is scientific and objective in that nothing is acceptable until it is corroborated by the sources. The authors themselves are often agnostic, if not openly atheistic.

The second kind of literature is inspired by a spiritual worldview and a gnostic frame of mind. Authors of this variety quote from the sacred and philosophical texts to construct decoding and evaluative instruments for the Islamic arts. Buildings to them are symbolic texts that are catalytic to states of mind. They find the particularities of history a bit distracting in their pursuit of the trans-historical meaning and message of Islamic architecture. They are most open and perhaps most daring in constructing cosmological explanations for buildings.

Finally there are the authors who try to establish a direct correspondence between Islamic jurisprudence and urban patterns and architectural forms. They too uphold the belief and the practice of Islam, but are in general very suspicious
of the gnostic and esoteric dimensions of Islamic thought. They are eager to accept climatic causalities and social correlations to establish their thesis that the sharia is the prime form-giver of the Islamic environment. They are equally quick to reject or pronounce as religiously unacceptable any attempt to construct an architectural theory that explains the mausolea of Islamic history.

It is understandable that authors holding these three very different points of view have great difficulty understanding one another’s work. Very often the positions are frozen, and lines so firmly drawn that one group can no longer face the other. Open discourse is essential, and only honest criticism can bring the polarized academics of Islamic architecture closer together. Only then will the healthy and constructive instruments of criticism emerge that are so essential to the growth of Islamic architectural thought in our own time.

The very title of this paper will quickly classify it as one of those esoteric, spiritual, emotional, romantic, perhaps even idealistic, and worse yet “academically indefensible” pieces of writing. But I can only say that it is intended as an honest attempt to build a case for the Quranic and prophetic sources of cosmological thought. In the following paragraphs I will try to identify the six basic concepts that are the essential precursors to any Islamic cosmology and to propose that architectural modalities are inspired by Islamic thought and its architectural legacy.

1. **Boundaries beyond boundaries.** Ibn Sina spoke of potential divisibility and essential continuity. The Sufis explained the hierarchical progression of creation from Hahut, Lahut, Jabrut, Malakut, and Nasut. The Ikhwān al-Safā (Brethren of Purity) charted the cosmic hierarchy from the “highest of the high to the lowest of the low,” and al-Fārābī presented a “teleology of happiness” by postulating an array of cities allegorical in their characteristics from virtuous to wayward to renegade to ignorant. Of course the Quran speaks of the seven heavens “in order one above the other.” Islamic thought structured itself in the manner of hierarchies that always started and ended with the profession of Grand Unicity. It is little wonder then that the architecture of Muslims expressed conceptual, spatial, and architectonic hierarchies without breaking down into staged compositions of forms and spaces.

2. **Orientation beyond axially.** The Muslim has always been trying to orient himself in the undifferentiated vastness of the earthly exile. But how would he face this placeless, spaceless, and timeless God? In what direction and how? No one but God could lead him out of this enigma. So God instructed Gabriel to locate a foundation for the Blessed House; he instructed Abraham to build the house, and he instructed the believers to turn their faces toward that house wherever they were on this earth. God also revealed to the Prophet the etiquette and the body rituals of the prayer at the prescribed times of the day and night. From this came the musalla, the archetypical Islamic place. It sits symmetrically and bilaterally on the crossing of the great circle passing through the Ka‘ba and the concentric circles emanating from the Ka‘ba. The body postures from qayyam to ruku‘a to sujud progressively establish the spatial orientations and ultimately the place. During the qayyam the lateral plane of the body defines the parallel of the boundary wall that is behind and the qibla wall that is in front. As the torso descends into the ruku‘a and is held up by arms bracing the knees, a plane is defined that locates the man, the mihrab, and the Ka‘ba. Finally as the body reaches the state of sujud, as the forehead, two hands, two knees, and two feet define a symmetrical heptagonal piece of the earth. As the praise to “Lord the High” is uttered three times, the
upright axis between man the enlivened earth and God the one whose throne encompasses the cosmos is finally established. At that time, as the individual musalla becomes the global mosque, the man for a brief moment has connected himself to the Divine. For an instant, all materiality has disappeared. But as he raises his head and as he returns to the world of shapes and forms he finds himself sitting in the center of the Cordova mosque, or in the courtyard of Sultan Hasan, or perhaps under the dome of the Süleymaniye.

It is little wonder then that al-Biruni almost a thousand years ago, in presenting his methods for calculating the orientation says, “When both the longitudes and the latitudes of two towns are known, other relations connected with them become known. They are the distance between them, the direction of the one relative to the other, and the points of intersection. . . . They are very useful relations on the earth and in the hereafter.” Dodd and Khairallah note that the morphology of Islamic plans are almost indistinguishable when they are divorced from scale and text. The plans are simultaneously mandalas and cosmograms. The house may look like the mosque, the mosque like the madrasa. The fountain with four water channels may be the same as in the chaharbagh garden, which in turn may be divided or enlarged forever.

3. Journey beyond movement. Belief in the flow and flux of creation toward its destiny in God has led to the expectation of a journey without the necessity of physical path or processional movement. This is an ontological movement free of physical displacement. To evoke such a state of mind is Islamic architecture’s most noble challenge. It is in this sense that architecture becomes the sacred stage and simultaneously the invisible choreographer of Islamic life. The Süleymaniye in Istanbul, from the courtyard through the mosque to the “garden of the dead,” reminds us of the journey of destiny within the living külliye. The muqarnas dome over the remains of Nur al-Din Zangi in Damascus points out the journey from the earth to the heavens.

4. Presence beyond representation. Concrete sensual reality is always overpowered by the pervasive presence of the spirit which is independent of the senses. The Divine is beyond image and representation. Though places can be appointed by him as his signs, he in his glory is beyond place, space, and matter. In the famous parable of Hallaj when his beloved visited him in the cell the entire prison disappeared. The divine presence can only be alluded to by the absence of matter and the quintessential light that casts no shadows. It is little wonder then that the light that lifts the dome, cosmogonic muqarnas that can transform masonry into a starlit journey upward to the black light beyond, reflecting water that defies the terrestrial gravity by bringing the cosmos into the courtyard and the colonnaded infinite void that reverberates the recitation forever, all these and more are Islamic architecture’s way of invoking the presence of the one who cannot be represented.

5. Eloquence beyond speech. As the epistemology of Islam is dependent both on the pure text of the revelation and on its exegesis so does its architecture employ the sacred word both for its pure presence and for its meaning and correspondence with place and purpose. Not all architectural calligraphy is to be read; it is there as a talisman, a frozen invocation for baraka. At other places it is easily identifiable because the text is already committed to memory by the believers. The word fills the space with intention and makes the matter worthy, just as the Quranic text gives an empty book the revered status of the mashaf.
6. Life beyond life. Muslims have produced an impressive body of living mausolea, charitable and educational foundations, civic amenities, and gardens that carry on life as the dead rest until the Day of Judgment. Considering the Prophet’s pronouncement that “three things will live beyond the life of an individual: pious progeny that will pray, knowledge that will keep benefiting, and the charity that will not cease,” it is not surprising that the architecture of death has become the medium to make the temporal timeless. With the tombs of the saints and the generous patrons come the charitable kitchens, Quranic schools, and other amenities. Millions visit the saints, not to ensure that they are encased in a grave, but to experience, beyond the constraints of time, the place that memory and message have sanctified forever. Data Ganj Bakhsh’s grave in Lahore is washed on special days, and the water then taken to irrigate the parched gardens. More pilgrims come to visit Mevlena Rumi in Konya today than they did when he was alive. Only those worthy of life beyond life have earned living tombs in Muslim cultures. It is this view of life, death, and life through beneficent knowledge and incessant charity that has made it possible for history to leave us the Sultan Hasan madrasa, mosque, and mausoleum in Cairo.

7 Trusteeship beyond ownership Man is the vicegerent of God and not a tyrannical exploiter of nature. His earthly sojourn originates with an ethical covenant and is to end with divine justice. The Quran has stressed the analogous correspondence between man and other creations and suggested ethical values and mutual rights. Man has been given rights over nature, but with full ethical responsibility and ultimate answerability. Pride and arrogance, especially its tyrannical manifestation on fellow man or nature are abhorrent to Islam. Social and environmental ethics have resulted in codes of planning and building behaviors that have been well researched by now. An attitude of trusteeship toward nature (khilafa fi’l ardi), social sensitivity toward neighbors, and restraint against open ostentation all combined to precipitate a quality of ecological harmony, social decency, and gentle scale.

In conclusion, we may say that Islamic architecture, beyond the essentials of functional appropriateness, ecological harmony, and technical finesse, developed distinct qualitative attributes, some of which have been discussed here. Islam is a God-directed social order, and its creative expression remains disciplined by its ethical aspirations. Its aesthetic is primarily esoteric. Its architecture has placed emphasis on the inner and the hidden. If God is beautiful and loves Beauty and if this God has chosen to be hidden, then his servants must prefer beauty that is veiled. If he is zahir only through the effects of his sifat, then the architecture must be apparent only through the phenomena it precipitates and the states of mind that it evokes.

God created the law-abiding universe, and from a particle to the galaxy it remains in abject obedience. He then created man, with potentialities for knowledge and freedom of belief. In this man, he created a thirst for truth and a weakness for diabolical seduction. Neither the devotion of the angels nor the obedience of the cosmos can match the station of man who is in search of the Divine. It is in this pursuit that man makes the dwelling and places himself in it so that he may recognize his own selfhood and through that, perchance, he may achieve the cognizance of his God. This to me is the essence of any cosmology expressing itself through architecture.
Notes

1 Gulzar Haider, “The City Never Lies,” Inqury 2.6 (June 1985): 38-44.

2 In Western philosophy, Descartes, Leibniz, and Newton brought the Greek and the medieval view of cosmology into closer harmony, Kant considered cosmological questions to be inherently unanswerable. Post-Kantians attempted to merge issues of cosmology with metaphysics, but the opponents rejected both as without significance and value. C. S. Peirce, the American Realist philosopher, proposed perhaps the most radical cosmology in modern times when he suggested the three cosmic principles of chance, law, and continuity. Whitehead is among the most recent Western cosmologists whose inspiration comes from Plato’s Timaeus.


4 Man attempts to impart cosmic order to the earthly chaos. Many rituals associated with the establishment of possession and settlement can be linked to mythological events. “One says that one is installed when one has built a fire altar (gātaputra) and all those who build the fire altar are legally established” (Shatapatha Brahmana, VII.1.1.1-4). By the erection of a fire altar, the goddess Agni is made present, and communication with the world of gods is ensured; the space of the altar becomes a sacred space. , consecrating a territory is equivalent to making it a cosmos, to cosmicizing it.” See Mircea Eliade, The Sacred and the Profane: The Nature of Religion (New York, 1957), p. 30.

5 The mountain peaks like Annapurna (“full of good,” referring to Parvati who is the daughter of Himalaya) and Gauishankar (unclothed Shiva) are personified in the Hindu myths. The River Ganges, the “Original River,” has the status of a goddess that gives life and ultimately receives the body’s ashes. One of the holiest shrines is the legendary fountainhead of the Ganges. For the North American Indians, the “Great Spirit” expresses itself through the wind. Nostalgia for Paradise is one of the oldest types of mystical experience in biblical societies. See Mircea Eliade, Myths, Dreams, and Mysteries: The Encounter between Contemporary Faiths and Archaic Realities (New York, 1961), chapter on “Nostalgia for Paradise in the Primitive Traditions.” pp 59-72. Cosmologically sacred trees and rivers of life existed in all the ancient Mesopotamian, Persian, and Hindu myths; see Elizabeth B. Moynihan, Paradise as a Garden in Persia and Mughal India (London, 1979), pp. 1-12.


7 All sects of Islam accept the timeless legacy of the Prophet Muhammad as immanent through the Sunna and the Hadith. Some sects go beyond this and consider his wisdom to be living and guiding through the person of an imam, living or awaited.

8 Potentiality of knowledge is in the created nature of man. The attainment of that knowledge, however, is another matter.

9 Numerous verses in the Quran refer to the ‘ulal al-bah (men of understanding) and two mention the rasikhun fl’l-ilm (those well grounded in knowledge). Verse 3:7 which is relevant to this discussion brings both categories together:

10 Quran 85:22

11 Man alone can contemplate Divine Revelation, and Muhammad, the one among all creation, alone has been chosen to receive the final revelation, the Quran. The inability of the rest of creation to withstand the glory of the Quran is evident from Quran 59:21.
12 The perfect man is neither the superman of a Nietzsche nor the ideal man of some Utopian construct, but the man who has attained his perfection through the acceptance of his Creator’s challenge and the total consumption of his being to the fulfillment of his covenant. To grasp the Islamic position on the station of the prophets, see Ibn ‘Arabi, Fussus al-Hikam, translated by R. W. J. Austin under the title Bezels of Wisdom (New York, 1980). For the doctrine of al-insan al-kamil, the perfect man, see ‘Abd al-Karim al-Jili, Universal Man, trans. T. Burckhardt (Sherborne, 1983). Al Jili, beyond making the most eloquent case for his doctrine, proposes a correspondence between the prophets, planets, and the epochs of history. An important work on this subject, not yet available in English, is Ustad Muttaza Matuhhari, Kamil-e-Kamil (in Persian).


16. Quran 41:9-12; see also 10:3; 16:68; 30:30; 67:3-4

17. Quran 95:4

18. Quran 15:26-29


21. Quran 7:16-17; 15-39. Iblis has also been identified as the “enemy” in 20:117 and as the “chief deceiver” in 31:33

22. Sura al-Asr (103) encapsulates this point by asserting that all humanity considered over the entire expanse of time is in a state of loss except those people who have professed their belief in the Divine Schema (and have thus accepted their own role in it), whose actions are accordingly righteous and who persevere against all odds on His Way (the Way as manifested in the person of the Prophet).

23. In order to develop a feeling for the simultaneous necessity of the Quran and the Prophet in Islamic thought see chapters 2-3 of Fritjof Scuon, Understanding Islam (London, 1963); also n 12 above

24. Quran 5:3; see also 30:30

25. Sheryl L. Burkhalter, “Complenion in Continuity: Cosmogony and Ethics in Islam,” in R. W. Lovin and F. E. Reynolds, eds., Cosmogony and Ethical Order (Chicago, 1985), pp 225-50. Burkhalter quoted Prophet Muhammad’s “Farewell Sermon” from a reference in Ibn Ishaq’s Siar (p 651): “Time has completed its cycle and is as it was on the day that God created the heavens and the earth.”

26. Those sayings of the Prophet that are accepted as the pronouncements of God, though not part of the Quran.
27 Nasr, Islamic Cosmological Doctrines, p. 11, n. 24; all through this valuable book, and especially in the discussions of the Rasa'il of the Ikhwan al-Safa, there are references to Greek thought. See also the introduction to Richard Walzer, Al-Farabi on the Perfect State (Oxford, 1985), pp. 1-18

28 Quran 24:35-36

29 Quran 7:54; 10:3; 13:3; for the associations of angels to the Throne of God, see 39:75; 69:17


31. Quran 17:1; for a more detailed account of Isra and Miraj, see A J Arberry, Sufism (London, 1950), reference to the Risala of Abu'l Qasim al-Qushairi, p. 29

32 This has been discussed in detail by one of my students in an undergraduate thesis, Noorzehan Mahayuddin, "The Beloved’s House," Carleton University, Ottawa, 1985.


34 Numerology in the Rasa'il of the Ikhwan al-Safa, see Nasr, Islamic Cosmological Doctrines, pp. 47-51. See also Majid Fakhry, A History of Islamic Philosophy (New York, 1970), section titled "The Mathematical-Philosophical Presuppositions of the Brethren," pp. 188-93

35 One of the earliest expressions of this position in Islamic thought is attributed to 'Ali ibn Abi-Talib. 'The belief has survived the times and cultures of Islam and has been expressed in various ways in Sufi poetry of all languages. For example Mian Muhammad Bakhsh (early 20th century) in his Saif al-Muluk, which is one of the classics of devotional-philosophic poetry of the Subcontinent, says: "The One Who has no dwelling/Dwells in all dwellings/Behold! He upholds/Everything every instant"

36 To appreciate the concept of utmost centrality and nearness to God, see Quran 2:186 and 50:16

37 Quran 7:180; 20:8; 59:22-24

38 The word ayet (pl. aya'at) is one of the most frequently used words in the Quran. It is used for Revelation, for the cosmological phenomena, for the bounties of God to man, and the innermost realizations of the human soul. See Quran 41:53

39 Khaja Khan, The Philosophy of Islam (New Delhi, 1903); in his discussion of the doctrine of 'ayaan-i thabita (p. 105), he points out the necessity of sifar in man's understanding of God

40 Quran 57:38: “Allah is free of all wants (qhan) and it is you [i.e., mankind] who are needy (fiqara'a).” “Allah is rich and man is poor/He is Light and man in search of the flame/He is Knowledge and man, the one forgetful/He is Spaceless and beyond Time/And it is man imprisoned in dimensions

41 Quran 7:180, “The most beautiful names belong to Allah, so call on Him by them.” Asma al-husna thus became the potential path to His cognizance.

42 Revelation acts on the civilizational mass to give it form; see Nasr, Islamic Cosmological Doctrines, pp. 5-6

43. Quran 67:3-4

Entropy is a measure of disorder in a closed thermodynamic system. Qualitatively, the term can be used for the tendencies of progressive degradation of the matter and energy in the universe to the ultimate state of inert uniformity. Thus to be entropic is to be on a path of increasing chaos. Buckminster Fuller in his numerous writings said that human faculty of reason on the path of creativity is "neg-entropic." A. N. Whitehead in his essay, "The Function of Reason," also suggests that the ability of human reason to "enhance the art of life" distinguishes it from other entities.

"But will abide forever the Face of Thy Lord, Full of Majesty, Bounty, and Honour," Quran 55:27

Quran 2:154; 3:169-70

This view is essentially the hermetic and Pythagorean view of the Ikhwān al-Safā, as compared to occasionalistic and atomistic view of the Aḥsārīs, such as the 10th-century al-Baqillānī.

Tanzih is the Absolute Transcendence of God independent of the manifestation of attributes. Tashbīh is symbolism with the aim of bringing forth the manifestation of the Divine. For a discussion of the simultaneity of the transcendent and the manifest, see Nasr, *Islamic Cosmological Doctrines*, pp. 9-10; see also the reference to Mulla Sadra, above n. 44.

One of the earliest expressions of this position is in a poem of 'Ali ibn Abi-Talib which can be paraphrased as follows: "Your ailments are from within but you know not/ The cures are also within but you see not/ A manifest text every word of yours puts forth hidden truths/ You who consider yourself to be a minute atom/ Are the dwelling of a grand cosmos." Most Sufi writings express this simultaneity of the microcosmic and macrocosmic aspect of man. Of special note are Jalaluddin Rumi, Mathnawi-i Manawi, Abdul Karim al-Jili, al-Insan al-Kamil, and Mahmud Shabistari, Gulshan-i Raz.

It is difficult to present a comprehensive bibliography here. Those interested may consider the writers of Nader Ardalan, Laleh Bakhtiar, S. H. Nasr, Titus Burckhardt, Muḥsin Mahdi, James Dickie, Oleg Grabar, Renata Holod, William Porter, Yasser Tabbou, Güstru Necipoğlu, and Gulzar Haide. Many valuable discussions on the subject have been recorded in the proceedings of the Aga Khan Award seminars, especially Seminar 4, *Architecture as Symbol and Self-Identity* (Geneva, 1980).

It is very difficult to find serious symbolic analyses of even the most important monuments, such as the north dome of the Masjid-i Jāmi at Isfahan; the Bagh-i-Fin, Kashan; the Sultan Hasan complex in Cairo, and many others.


It is not my intention to review the current literature on Islamic architecture, but I do feel that unfair and unproductive discussions can result if one is not aware of some of the distinct "headspaces" from which these writings come forth.

Nasr, *Islamic Cosmological Doctrines*, p. 222

Khaja Khan, *Philosophy of Islam*, pp. 17-18

See the cosmic hierarchy according to the Ikhwān al-Safā in S. H. Nasr, *Islamic Cosmological Doctrines*, p. 71.


Quran 67:3

Literally the "place of prayer." The word can refer to a prayer rug, a designated prayer space (not necessarily a mosque), and a large open area outside a settlement marked by a qibla wall, perhaps with a built-in miḥnah and a minbar, used for very large gatherings such as the ṣaḥāra prayers.
61. See above, n. 32


67. For three quite valuable, but different discussions on Islamic miniature paintings, see S. H. Nasr, “The World of Imagination and the Concept of Space in the Persian Miniature,” Islamic Art and Spirituality, pp. 177-84; Michele A. De Angelis and Thomas W. Lentz, Architecture in Islamic Painting, Permanent and Impermanent Worlds (Cambridge, 1982); Alexandre Papadopoulos, Islam and Muslim Art (New York, 1979), pp. 81-122.

68. One very good example is the Throne Veise (Ayat al-Kursi), Quran 2:255, which is one of the most commonly used Quranic inscriptions in Islamic architecture. It is so familiar to Muslims that it can be recognized from one or two words. After that the outlooker can merely confirm that the inscription matches the memory.

69. The objectification of the Quran as a book.

70. A widely accepted and quoted saying of the Prophet Muhammad.

71. Quran 6:38.

72. This point has been discussed in some detail in my “Habitat and Values in Islam: A Conceptual Formulation of an Islamic City,” in Z. Sardar, ed., The Touch of Midas (Manchester, 1984), pp. 170-208; idem, “Man and Nature,” pp. 47-52.

73. The works of Saleh al-Hathloul, Jamel Akbar, Waqar Husseini, Ali Safak, and Besim Selim Hakim are noteworthy in this area.

74. One of the sayings of the Prophet Muhammad: Man araj fa naṣahu, fa-qud’ arafa rabbahu (“If you have reached the cognizance of yourself verily you have reached the cognizance of your Lord”). This theme pervades Islamic esoteric thought. For example, Mansur al-Hallaj, “I saw my Lord with the eye of the heart. I said: Who are Thou? He answered: Thou.”
ARCHITECTURE
BASED ON
AN ANALYSIS OF
THE UNDERLYING
PRINCIPLES
At any given time the man-made world is inevitably the measure we use to determine the direction of change. Whatever we may think of it, the world around us provides the basis for decisions about the future. We are keenly aware of its deficiencies, but not always so aware of its strengths. From time to time it is wise to pause and consider whether when we change something, we consider what we might be losing. The corollary to this is to look back to see whether what we lost yesterday might, with a little effort, be regained. This involves a study of precedents and of learning from others.

Studying precedent is not limited to building, of course. When they were taking Cubism through its paces, Picasso and Braque were also spending days at the Louvre analyzing the work of earlier artists. Precedent can serve as a source of inspiration and innovation.

For the architect and urban designer precedent has other dimensions besides the practical one of improving design by learning about specific approaches from past developments. By thoughtful analysis, it can also help us find various methods for

Figure 1:
Tripoli, Libya. The western quarters of the old city showing how the main roads are separated from the central street of each quarter and its side lanes.
making new environments less alienating and therefore more satisfactory to use.

But there is another, bolder argument for the benefits of considering precedents in architecture and urban studies. This is that built form can have a direct influence on social behavior, a deterministic belief that human beings respond both psychologically and physically to the environment through a whole spectrum of conditioned responses that can ultimately determine whether behavior is socially conforming and communally oriented or aberrant and selfish. A second version of this claim goes even further to argue that forms of the environment created by strong communities based on traditional quarter structures, in which the entire neighborhood lived and worked together as a kind of “extended family” might be duplicated today to resurrect communal structure or at least something akin to it. Such urban cohesion is unlikely to be achieved without a physical framework that can support it, but to achieve this we need to understand the wisdom behind the structure of traditional urban quarters.

A third argument based more clearly on demonstrable grounds derives from analyzing patterns of built form to study characteristics such as the relationship of density to height, or areas of access and open space to areas of built form, and of road widths to the type of activity which goes on in them. From these data it is argued that the low, densely built urban development patterns of the past produced greater advantages in terms of sun, light, air circulation, and convenience than modern patterns do.

A final argument for using precedent combines settlement patterns with a vocabulary of visual expression that is instantly recognizable to the inhabitants and provides a reassuring familiarity. This can, it is argued, be used to join old and new parts of an urban area together into a harmonious whole.

In Islamic cities, architects cite three characteristics of traditional Islamic environments as the basis for applying precedents. The first is the division of Islamic towns into separate quarters, each focused on a central street from which short, dead-end lanes lead to the houses. Through streets carried traffic through the quarter but tended not to be so integrated into it. The second characteristic was that
the inhabitants were thrown into constant social contact with one another because of the narrow and essentially pedestrian streets (with the exception of the through streets) and this, it is argued, served to reinforce the social cohesion of the neighborhood. The third characteristic was that the range of visual perception was small, and a balance of scale between public and private buildings was regarded as necessary.

The reason behind the creation of quarters in Islamic cities resided in the organization of society itself. The nuclear family which is today the norm was then almost unknown. Families were large, with a patriarch or matriarch presiding over children and grandchildren and making home life a strong extended economic unit. The extended family was in turn only a part of the much larger clan, which gave it social and economic security. Many, perhaps all, families in a clan lived in the same quarter. The clan was in turn strengthened by belonging with many other clans to a tribe. Urban quarters came to represent aggregations of clans of friendly tribes, and they were separated by open spaces from those of hostile tribes who might reside in neighboring sections of the city.

The existence of open spaces in these cities is well attested. They are mentioned in early historical and geographic sources, revealed in archaeological excavations, and still survive in many well-preserved old towns today. In addition to open spaces, quarters could also be separated from each other by main vehicular streets, by suqs, and by intrusions in the urban fabric such as mosques and other large buildings.

The great advantage of the quarter system in the old Islamic cities was the communal cohesion it provided. The short culs-de-sac off which only a handful of houses were entered served as extensions of the privacy of the home. Strangers in the lanes were asked their business, and if their explanations were unsatisfactory, they were sent on their way.

In the main street of the quarter, too, special circumstances prevailed. The width of the street was so constricted that craftsmen and shopkeepers could converse across it and passers-by would exchange greetings as they stepped out of

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Figure 4: San’a, Yemen. Plan of the old walled city. The open spaces between the quarters are indicated by dotted shading.
each other’s way or avoided a passing vehicle. All the needs of the community—religious, social, commercial, creative, and recreational—were catered to on this central street. Shops and light-industrial and craft workplaces were gathered there; public baths and coffeehouses provided relaxation. Public spaces were rarely very large, but trees could be enjoyed in the quiet market gardens between the quarters, along the roads or rivers, or in the surrounding countryside.

The organization of the traditional quarter is being scrutinized today as a new source for architectural inspiration. One of the useful principles found is the clear separation between through streets and quarter streets. Keeping the quarter streets
deliberately narrow and providing a third order of dead-end lanes leading only to private houses, restricting open space mainly to houses, either in adjacent gardens or in courtyards, and to the central courtyards of mosques and other public buildings are others.

The building façades on the street rarely had openings, aside from doorways, and houses therefore had no individuality expressed in the building’s façade. Character was found in the reception rooms and in the courtyards. External anonymity meant that the urban fabric of the quarter could become dense and reflected the enriched communal life that such density generated. In reaction to the urban sprawl of today, some architects have tried to revive this traditional kind of environment in housing or neighborhood schemes such as the new town of Shushtar in Iran, designed between 1975 and 1977 by D.A.Z. Architects; the Asian Games Village in New Delhi, India, designed in 1981 by Raj Rewal, and the Dar Lamane Housing Scheme in Casablanca, Morocco, completed in 1983 and designed by Abderrahim Charai and Abdelaziz Larak. The architects believe that they have produced in them better built forms based on studies of precedent, forms more likely to weld people together into communities that will be safe for children and by reducing walking distances to a minimum, diminish reliance on the motorcar, and thus make social contact and interaction easier and more likely to become a powerful factor in the life of the neighborhoods.

A second kind of precedent now being utilized is the practice of building houses up to the street line and to the side boundaries, so that each abuts its neighbors to right and left. The advantages are twofold. First room is left, at no additional expense, for either a courtyard or a small garden at the rear. Second, urbanity is
Figures 9-11:
Casablanca, Morocco. Dar Lamane Housing scheme, completed 1983, designed by Abderrahim Charai and Abdelaziz Lazrak. A reinterpretation of the traditional Islamic environment. (Photo: C. Lignon, Aga Khan Award for Architecture.)
assured and the streets become outdoor rooms flanked by continuous walls. It is
felt to be an advantage to go to some length to preserve these urban walls, even
when the site is an awkward shape or, for some reason (such as turning toward
Mecca to pray), the main space of the buildings has to be an an angle to the street.
This kind of building was common in the eighteenth century in Europe and
America as well, and some architects are reviving it today.

Figure 13:
Cairo, Egypt. Al-Aqmar
Mosque showing how its
façade is built up to the street.
Architects are also now trying to avoid anonymous spaces in buildings, aware of the need to give expression instead to a particularly Islamic strong, clear volume and space that make buildings both livable and visually enjoyable.

Those who have to design infill in old quarters are now trying to achieve an appropriate scale and pattern and this also leads to the use of precedent and an analysis of the characteristics of the visual ordering of elements in the surrounding buildings. In Istanbul this resulted in an interesting experiment which involved placing a shopping mall and an office complex into an old quarter of timber houses. The project received an Aga Khan Award in 1987. Its designer, Sadat Eldem, conceived this large program as a connected series of small buildings of various heights, so that the ensemble relates to both its sloping site and its urban context. The wide shopping mall is treated as a volume running through the first story of all these small buildings and is only visible as low links between them. The resulting structure fits remarkably well into the old quarter while still perfectly performing its function spatially and practically.

Two schemes by students in the Design for Islamic Societies unit of the Aga Khan Program illustrate this approach further. The advanced studies group
considered what the constraints and solutions might be if a large complex of new buildings had to be injected into the surviving fabric of the old town in Bahrain. For this purpose the program of the new Gulf University was used, but the site was moved to the central town of Rifāʿ al-Sharqī and placed on the edge of an escarpment dropping down to the southern plains. Attempts were made to fit the fabric of the university naturally into that of the town, without sacrificing its functions, by looking for essential qualities in terms of scale, matrix, and the handling of open and private space. Using this approach the communal qualities of a university as a microcosm of a small town were emphasized.

Architects from Islamic countries are not the only ones looking at precedent. The same phenomena are observable in the West, and in all the creative arts. Frank Lloyd Wright used precedent when he built his prairie houses. They were centered on a massive fireplace, as were early American colonial houses. LeCorbusier's section for the Unité d'Habitation was perhaps derived from the traditional rabţī in the Middle East. Clearly parallel, too, is the way old European city centers are inspiring new pedestrian zones in European and American cities.

Now is a time of consolidation and reassessment in architecture and urban design. Learning from the built environments of the past is one of the legitimate approaches and not only in the Islamic world. Trying to understand the space-form languages characteristic of a locality and build on them is one way to respond with sensitivity to the existing world and one way of providing reassuring continuities in a world of frequently irrational, accelerating changes.

To the question, does precedent present ready solutions for the development of

Figure 16: Bahrain. Project for the Gulf University, 1986, by Hana Alamuddin. The academic departments are focused on the courtyards and spaced on either side of a narrow, central street which is lined with study, research, and recreational facilities. In the center is an open square on which faces the mosque. The edge of the old town of Rifāʿ al-Sharqī and the escarpment are at the bottom of the drawing. Ranged along the escarpment is student housing.
modern neighborhoods in Islamic cities or models for the patterns of organization of large building complexes?, the answer is, of course, a clear and equivocal no. There are too many new aspirations which make the precedents difficult to apply: motorized transport and its accompanying requirements of parking, access of equipment, and so on, is only one example. A great deal of thinking is necessary before workable solutions are found. But the old patterns are there to be learned from—and to many their strengths and advantages are undeniable.

Only since the late 1960's have we become aware of the extent of divergence between traditional Islamic systems of life and form in the city and those of Western Europe through detailed studies of the social structures of Islamic cities, such as those of S. D. Goitein, R. B. Sergeant, and many others, and through parallel studies of European late medieval cities and social structures, particularly those of Peter Laslett and the Cambridge Group for the History of Population and Social Structure. From the work of the latter it now appears likely—in spite of popular myth—that the extended family living together in one household was not a fundamental formative characteristic of the medieval city in the West. There is no evidence that it was common in Europe, and certainly it had no influence on the shape of the European city at least from the beginning of the sixteenth century, the earliest period for which extensive records are available. By contrast, the extended family has clearly been a fundamental force up to the present day in Islamic cities throughout Asia and Africa. For this and a number of similar reasons, designers have grown to doubt the appropriateness of Western city planning ideas introduced into Asia and Africa, to look again at their effect on social structure and patterns in Islamic urban contexts, and to turn back to their own precedent in attempting to develop alternative solutions.
Though not an Islamicist, but a Westerner with Western vision, I am eminently sympathetic to Islamic societies and their built environment. Though not a scholar, but a dilettante in the old-fashioned sense of the word, I apply a Western frame of mind and therefore a peculiar analytical approach to buildings and cities. To some this may appear impertinent and to others refreshing and challenging, not only historiographically but as an alternative way in which architecture and urbanism can be seen and represented. Ideally, the work of the historian and that of an architect/critic like myself complement each other.

Figure 1: Isfahan spread out like a carpet. Looking south toward the Meidan-i Shah and the mountains beyond. (This and all subsequent illustrations are taken from the author's traveling exhibition, "Formal Structure in Islamic Architecture of Iran and Turkistan.")
One half of the title of my paper introduces the subject, "Past, Present, and Future." Let me briefly address it. In Islamic cities in particular, new programmatic needs, coupled with new technological possibilities, conspire to make the job for today's architect and planner difficult, although, I would suggest, not impossible if certain design principles are observed.

Being aware of the underlying design principles of traditional architecture naturally helps in fulfilling the designer's task. To be able to distinguish among those principles inherent in any given design decision, free of place and time, on one hand, and those subject to forces emanating from the society and geography in which these principles are embedded, on the other, is the necessary refinement for forming a theoretical basis upon which new buildings can be designed and decisions on urban interventions made. "Alternative Methods of Analysis," the second subject the title introduces, involves quite simply a reductive process in the medium of drawing—although sometimes I could not resist extending this method to the camera (fig. 1).

One kind of drawing is the obvious single-objective freehand diagram. This type of drawing is meant to capture a particular concept underlying a spatial or experiential sequence, or a comparison between comparable or contrasting formal structures (figs. 2-3). A second kind of drawing is the less obvious reductive or analytical one. For an architect this second type is more challenging, because it

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Figure 2: Yazd, merchant's house, late 18th century; destroyed in the 1920's. The formal entry is at the western end of the southern perimeter. Moving north from the entry are the guest quarters, with their own court. The area to the east of the entry is the women's quarter (anderuni) with two small, symmetrical courts. This area also contains the family's summer quarters characterized by a spacious porch (talar) and cooled by a windtower (badghir) immediately to the south. Opposite, across the large men's court (beiruni), are the winter quarters and to its east the kitchen and latrines. All other rooms are general purpose.
Figure 3: Yazd, merchant’s house. The spatial and constructional tartan grid is contrasted with the principal and secondary plan “figures” which denote analogous-use differentiation. The lower diagrams emphasize (1) the opposition of the summer and winter quarters, and (2) the connection of the main and guest courts by a double-faced room. The latter accommodates both honored guests and “fringe” relatives.

allows one to manipulate the conventional plan, section, elevation or axonometric, etc.

At this point, I would like to define what I mean by “formal structure”—the essential part of the title of my exhibition, “Formal Structure in Islamic Architecture of Iran and Turkistan,” which was on view at MIT during the conference. Formal structure encompasses both the underlying order and its effects on any natural or man-made object or phenomenon based on inherent formal properties such as symmetry (axiality), hierarchy (progression), climax, repetition, and any others to which one can ascribe analogous functional and symbolic attributes and values. While formal properties are fixed through time and different cultural conditions, values are not. In other words, the term couples definitive formal givens with their latent interpretations and transformations realized through human instinct, imagination, knowledge, and ingenuity, which in turn are often governed by tradition, time, and place. However, no interpretation or value judgment is possible without first “recognizing,” that is seeing, inherent formal properties and their interplay and effect on each other.

Every drawing is analytical because its making is the result of many decisions about what to show and in what fashion, and, more important, what to leave out.

Figure 4 shows five representations of the Meidan-i-Shah in Isfahan: the original line drawing shown at the top of the sequence, and four successive additions. The structures below the Meidan are a hypothetical reconstruction of the royal or government district in the seventeenth century. The line drawing is, by definition, neutral—relegating choice of orientation and shape of cutout from the city fabric to another level of decision-making. On the other hand, the second drawing has all the walls which denote public structures, shown in solid black, thus producing what might be called a “figure” of public structures standing out against the general city fabric (also top of fig. 5).

The middle drawing in a further addition distinguishes roofs from open spaces in the residential fabric; otherwise known as a Nolli drawing (after the eighteenth-century Italian who made famous maps of Rome). The previous “figure” is now suppressed and replaced by an emphasis on all public spaces, whether open or covered. Here, one is invited to trace one’s footsteps from the Meidan, to the intricacies of the government district, to the prayer hall in the Shah Mosque, and, opposite the Shah Mosque, the concatenation of closed and open spaces of the bazaar.
By further adding distinction between roofs and open spaces among the public buildings in its penultimate transformation, the drawing has become a conventional figure/ground plan. The connective tissue of the city fabric is now all-pervasive irrespective of a building's use or of its mass and volume. It decisively contrasts all open spaces with all roofed spaces, coming full circle from the first drawing which set an empty stage. One obvious interpretation which the figure/ground representation suggests is the concept of _umma_. According to _umma_, the individual and the community are inextricably interdependent.

The bottom drawing is simply a photographic reversal of the previous one. It most emphatically makes the Meidan rectangle the dominant form of the entire building ensemble. So what! One may say, what does it all amount to in explaining the life of the city? I suggest that a calculated manipulation of two additional and fundamentally different interpretations of the Isfahan Meidan have come to light. One is the Meidan as forecourt to the royal government complex (middle drawing), the other is the same walled space as a civic gathering place (bottom drawing) (also fig. 5). The respective (imagined) experiences become real, depending on which role one chooses or is assigned: government functionary, courtier, or citizen doing business in the royal precinct, in the first instance, or plain Isfahani citizen or traveler passing through. One scenario depends on a certain geometric congruence and the unique character of this ensemble of the royal government precinct with the Meidan, while the other depends on precise definition of the perimeter walls to the point of exaggeration (fig. 6). This perception allows the space to become the largest (not to say monumental) “room” within the city. In this scenario, what happens beyond the perimeter walls is allowed to change over time without directly affecting the city’s symbolically central space—the Meidan.

Another instance where at least two scenarios coexist happens not far from the
Meidan in the main bazaar heading north towards the Friday Mosque (fig. 7). At a certain point, between the small Masjid-i-Jarchi on one side of the bazaar and the fountain-cum-resting place tucked in between the bazaar and the Carvanserai-Gulshan on the other side, the bazaar crosses a sequence of spaces which are linked in a remarkable way. I quote from the text in the exhibition (fig. 8): "The axial relationship between the public rest place with fountain and the mosque entrance is qualified by a number of formal, experiential and implicitly cultural characteristics, explicated in two diagrams" (fig. 9).
Both the mosque and fountain are pious institutions, one larger than the other; their relationship to one another is not obvious because the bazaar dominates the entire spatial experience. This condition existed at the time when the mosque was first built.

With the later physical connection of mosque iwan to bazaar, a spatial continuity between the mosque door and the rear wall of the fountain room is created (marked by an inclined plane symbolizing, with its fish-scale surface, a small waterfall).
The illusionary disappearance of the otherwise dominant bazaar-corridor, when viewed along the fountain-mosque axis, is in large measure due to the fundamental imbalance of the two spaces off the bazaar. It is a subtly calculated imbalance, achieved by the orchestration of formal and experiential elements in such a way that the axial relationship acquires a clear thrust from waterfall plane to mosque door. The spaces “telescope” from high, roofless, warm and light-flooded to low, closed, cool, dark, and grotto-like. Two columns seemingly “jump” forward out of the pool as the stairs ascend toward the arch of the iwan, toward ever more light.

Fountain room and mosque entry thus become one coherent whole. The domed bay of the bazaar which connects them also separates them as one moves through the bazaar.

In contrast to the Meidan, it is entirely a matter of individual choice whether or not to enter the fountain room and thus to partake in the disappearing act of the bazaar. It is the very disappearance of the bazaar as experienced from inside the room which affords that space such definitive separateness, a prerequisite for rest and calm.

Considering the urban fabric as a whole, it could be viewed as having distinct horizontal layers, as in Kerman, to reveal and understand better what binds it together, namely the courtyard pattern, the alleyways, and the bazaar, with its cupolas and occuli acting much like spotlights on a scene, while the wind towers dance above the unified roofscape (figs. 10-11).

Figure 10: Kerman, showing city fabric south of the bazaar. Aerial photo.
Figure 11: Kerman, three principal layers of a typical Iranian city: (left) domes of major and secondary bazaars; (middle) private and public courtyards of all kinds; (right) public circulation from bazaar to alleyways.

Figure 12: Comparison of main streets of Kerman (top), Bukhara (middle), and Khiva (bottom).
I would like to close with a mostly visual comparison of three bazaar or “main street” complexes, one in Kerman, one in Bukhara, and one in Khiva (fig. 12). The bazaar in Kerman, typical for Iran, is both figure and integral part of the urban fabric (fig. 13), whereas in Turkistan the independent figure dominates as in Bukhara (fig. 14). In Khiva, all buildings, public and private, seemingly float within the confines of the city wall (fig. 15); almost as if the nomads of earlier times had, for a while, pitched their tents on their endless journey (fig. 16).

Figure 13: Kerman. "Public figure" revealed in the city fabric.

Figure 14: Bukhara. "Public figure" in contrast to the rest of the city fabric.
Figure 15: Khiva. Public buildings and spaces in contrast to private structures and courtyards.

Figure 16:
Khiva. One of two octagonal openings in the roof of the large Friday Mosque, ca. 11th century. Although old and rectangular in shape, the building nevertheless suggests the city's nomadic origins by its simple wood construction and the lighting which comes only from above, as if to retain the memory of the yurt.
CHAPTER 10

Accretion of Decisions:
A Design Strategy

Jamel Akbar

When we search in the past for answers, we are admitting that we admire what people in the past have done. Whether we are searching for building forms or technology, a design process, aesthetic values, or efficiency in use, climatic response, or site utilization, what we find is the result of the experience of earlier generations. It is the outcome of societal processes and rarely a product of individual ingenuity. The question we should ask of that experience, then, should not be, what in it constitutes good design?, but what were the circumstances that brought about those good designs that were created?

The percentage of individual property owners in Muslim societies was very high. In a capitalist society there are proportionally more owners in the population than in a communist one because properties are owned by corporations, but Muslim societies show the highest rate of all, because of the principles that govern ownership in them. In the case of public spaces, for example, there can be almost as many owners as users. A large number of owners combined with an absence of regulations resulted in a society that depended on discussion, agreement, consensus, and convention to regulate its life. This circumstance has helped to transmit expertise that has been tested and refined over time from builder to builder and thereby to both create and improve good physical forms.1

The resources of many Muslim countries are not now equal to the needs of their growing populations. If in 1980, 51 percent of the population of Ankara and 45 percent of the population of Tunis were living in informal settlements,2 then a design approach that concentrates on the artifacts—the end products such as buildings, ornaments, etc.—without considering the process will not be adequate. Such design strategies can improve only a small fraction of the built environment. What makes the situation even worse is that the limited resources of most Muslim countries are controlled by a small number of decision makers in a political structure that does not allow people to question its investments. These decision makers usually try to impress their societies by constructing monumental buildings and in the process dissipate its wealth. A good example of this is the prestigious Bustan Palace Hotel in Oman built after the removal of a thousand-year-old fishing village.3 Limited resources are all spent on a few elaborately designed buildings that are supposedly inspired by Islamic forms and patterns. The strategy that I am proposing is to search for design tools that will improve the built environment in the Muslim world in ways that would make most efficient use of its limited resources.

Muslim countries cannot overcome poverty solely through applications of natural resources, capital, or infrastructure. The economist E. F. Schumacher argues that “development does not start with goods; it starts with people and their education, organization, and discipline.”4 If the role of the architect is to improve the level of built form, then he must first come to grips with the term “efficient
building.” Professionals should learn to built better buildings that consume fewer resources so that the limited resources available will suffice to provide buildings that allow society to function. Only when they begin to prosper will Muslim societies be able to enjoy the luxury of seeking an architectural identity or style.

The Prophet said, “There should be neither harming (darar) nor reciprocating harm (dirar).”5 This tradition was interpreted to mean that one may do anything in the environment so long as that action causes no harm to others. It was used by societies to judge the legality of individual actions in the absence of municipal rules. Any change made was considered on its own merits and judged by referring to this principle.

In practice, however, jurists have differed as to the exact meaning of this tradition and consequently on how it should be enforced.6 Darar has come to refer to anything an individual benefits from at the expense of others, for example, changing property from domestic use to a factory that produces noise or effluent and will be a nuisance to its neighbors. Dirar refers to a change that is a nuisance to others and does not materially benefit the acting individual, for example, cutting a new window that looks out onto a neighbor’s yard.7 The tradition has been interpreted by jurists to mean that the individual has complete freedom of action so long as others are not harmed. The only acts that are forbidden are those that affect another’s property, such as knocking or hammering on the neighbor’s wall, or those that affect the residents of the adjacent property—for example, an intrusion on a neighbor’s privacy—even if it is not physical. The tradition involves both physical and moral control.

The freedom of a party to act so long as it does not adversely affect others has led to the principle of the “right of precedence.” A property can carry the right adversely to affect the property of others within certain limits. Situations can arise where, of two adjacent properties, one has the right to affect the other, but not vice versa. For example, if a window in a person’s house did not overlook a neighbor’s house when the first house was built, then the owner of a house built subsequently cannot complain about violation of privacy and have the window sealed. Since the first person’s act preceded the second person’s, it is the second who has to adjust.8 The phrase hiyazat al-darar, lit. “possessing damage,” means the right of a property owner to inconvenience his neighbor because its owner preceded others in some action. Precedent suggests that “possessing damage” is attached to a property, and not to its owner.

Another well-known principle derived from the Prophet’s tradition is that “if two damages are concurrent, then the less severe should give way to the greater.”9 The greater damage is the one that prevents a person from doing something on his property that would greatly benefit him; the lesser damage refers to the objection by the neighbor over some not-too-severe damage caused by that act.10 Damage can affect either a property or its users; it can be visual, audible, or olfactory. Damage to properties can be direct, such as burning things near a neighbor’s wall; or indirect, such as introducing machinery that causes the neighbor’s house to vibrate. Aside from visual damage,11 almost any damage against a user or property in traditional environments was the result of changing the property’s function or of continuing a damaging situation that already existed.

Cases have been reported where people have increased the height of their buildings, thereby blocking their neighbors’ windows and cutting off their light and air. It was ruled that preventing a property owner from adding to his buildings was a greater damage than the loss of light and air.12 In another case a person installed a flour mill in one room of his house. His neighbor objected because of the noise; the ruling allowed the mill to continue because noise was not
considered damage severe enough to outweigh the loss of livelihood to the owner.\textsuperscript{13}

Noise did not constitute damage, according to Muslim jurists, but vibration of a neighbor’s walls caused by querns or millstones did.\textsuperscript{14} Ibn Rushd (the qadi of Cordova, d. 1126) states that sounds such as those made by blacksmiths, tailors, and cotton carders (naddafin) in plying their trade should not be forbidden. The noise was considered less harmful than preventing a person from earning his living.\textsuperscript{15}

Muslim jurists considered noxious fumes and smoke to constitute severe damage.\textsuperscript{16} In one case the neighbors complained to the judge about the smoke from barley processing in a mill. When the authorities who were sent to investigate reported the smoke as severe, the judge ordered the mill to stop.\textsuperscript{17}

Although an owner could change a property’s function if no harm to others was involved,\textsuperscript{18} the things that constituted “harm” or “damage” varied among jurists.\textsuperscript{19} Generally, however, it does seem that the risk or threat had to be considerable—building fires against a neighbor’s wall, for example, would clearly have constituted damage.\textsuperscript{20} It also appears that a shift in function would not be forbidden \textit{in toto}, but only the noxious aspect of it.\textsuperscript{21}

If no damage was caused at the time the action was taken, it could not be stopped, even if the action might cause damage later on—for example, building a tannery on empty land whose odor would be noxious to inhabitants if the land were later to become settled. I will call this a “damaging precedent” because the damage is inevitable. Potential damages such as cutting a window in a wall that might someday look upon a neighbor’s house is a “damaging act”. “Damaging acts” could be continued even if they damaged neighbors. Ibn Taymiyya (d. 1328) was asked to judge a case where the drainspout on the roof of one house was directly above another’s entrance. Did the owner of the second house have the right to demand the spout be moved? He answered that the drainspout had been installed first, and therefore it had the right to remain there.\textsuperscript{22}

Jurists’ opinions vary regarding precedent. When the neighbors complained about the smoke of a potter’s fire, for example, it was allowed to continue.\textsuperscript{23} In another case, a jurist was asked to decide a case where houses in Qairawan had been turned into tanneries, and then the tanners had moved out. Thirty years later they tried to move back and use the houses as tanneries again; the neighbors protested on the grounds that the houses had not had that use for thirty years, but the jurist said the tanners had the right to move back in.\textsuperscript{24} Some jurists, however, would not have allowed the precedent to stay in effect so long. Another jurist was asked to decide a case that involved pounding corn. The activity was forced to move out of the city because there were houses above; when the owner tried to come back, the judge said they could not because of the damage the pounding caused.\textsuperscript{25} These cases suggest that an owner has the right to damage others, if the action that causes it preceded their arrival, at least so long as the damage was not severe. Let us call this right “the right of precedence.”

The damage allowed by precedent can also apparently continue indefinitely into the future. However, the right of precedence did not result in a dominant relationship between properties but rather ordered the relationship between neighbors and created social bonds. In a Tunisian case neighbors fell into a dispute because a drainage ditch leaked into a neighbor’s well. Because the drain was built before the well, the well owner had to deal with the damage.\textsuperscript{26} The right of precedence also holds regardless of whether the property is individually or collectively owned. One of the properties abutting a collectively owned cul-de-sac, but having no access to it, had a disused septic tank in the dead end itself. The
owner of the septic tank decided to use it again, and the owners could do nothing about it because the septic tank had preceded the dead-end street.27

An owner can also do something that can cause damage if the other buildings around him are already causing similar damage. For example, an owner can install a forge in his building if most of the adjacent properties already have similar equipment.28 This is the principle that has led similar industries ending up in the same quarter of the city.

Right of precedence is established by action, not by building. If owner B puts a door someplace and owner A does not object, then owner B has the right of precedence; if owner A for some reason decides to object later on, he will lose the case.29 In a narrow, dead-end street two of the three houses were converted into hotels and the third owner did not object. Gradually the street became so crowded that the third house was no longer usable as a residence. The owner then did object, but his protests were overruled since the change had been made so long ago.30

To determine the time needed to gain the right of precedence, some jurists have referred to the Prophet’s tradition which says that the one who possesses something for ten years has the right of precedence if within that period the person lodging the complaint has not protested. Others take each case individually and use no set period of time.31 All seem to agree, however, that in cases, such as latrines and tanneries, where the noxiousness of the damage will increase over time, there is no right of precedence, regardless of time, unless the owning individual established the function before the person lodging the complaint was there.32

These principles make all property owners very aware of their rights. When neighbors protested after a lime-kiln owner built a second fireplace because it caused even more smoke, the new fireplace was declared illegal.33 If property changes hands, and the buyer is not informed of the prior rights of his neighbors, he still does not have the right of protest, though if the damage is under litigation when the property changes hands the new owner does have the right to pursue it. Ibn al-Rami reports a case in which a person bought a house; after he had lived in it for a while, his neighbor asked permission to enter the house to clean the drainage ditch which ran under it. The new owner refused on the grounds that he had not been informed of this right of precedence. They appealed to the judge Ibn ‘Abd al-Rafi’ (d. 1333), who ruled that the neighbor did have the right to clean his ditch, but that the purchaser had the right to sell the house back to the original owner and that the original owner had to return the purchase price, which he did.34

The right of precedence defined the relationship between owners in terms of a series of constraints. Each succeeding owner has to deal with all the decisions made by his predecessors. When a man built a room in the courtyard where a drainspout of his neighbor’s house was located, the judge ruled that he could not stop the person from building the room but he could require that the builder allow the drainspout’s owner into the room and that he could bring witnesses with him to confirm that the spout was still there. The owner of the drainspout had the right of precedence, and the builder had to deal with that constraint.35 In order to offer complete freedom to builders, the environment should be seen as a series of constraints. “Damaging acts” and “damaging precedents” resulted in the “right of precedence” which ordered the relationship between owners as a series of constraints resulting in an “accretion of decisions.”

The accretion of all these decisions dealing with windows, doors, party walls, passageways, water spouts, cisterns, overpasses, and the like, produce in these built environments a network of relationships between each owner and his neighbors. Water was a particularly common source of decision and constraint. Ibn al-Barra’,
for example, was asked to judge a dispute in al-Mahdiyya that arose when a man who had bought the ground floor of a house on condition that he could collect the water for his cistern from a drain on the upper floor then sold it. The owner of the upper story soon tried to put the drain in another place, but the new owner of the ground floor was able to stop him through right of precedence. In another case, when a person bought a house the seller told him that the rainwater from the neighboring house would drain onto his property. Later, however, the buyer was able to stop the water draining onto his house by arguing that it must include washing water since it was draining constantly, while rainfall was rare, and that the precedent only allowed for rainwater.

The sophisticated conventions that governed the traditional Muslim environment resulted from these principles that gave such importance to freedom of action and to precedent. They also influenced regional architectures, explaining, for instance, why wooden screens are to be found all over the façades of buildings in old Jeddah and few on the façades in old Riyadh. Each type was based on a few rules that every user and builder followed and that had a simple spatial organization that was easy to understand but that could become rich and complex when it was repeated according to the conventions that governed form making. These conventions were of two types: those governing the creation of spaces and those governing building materials and their assembly.

The most efficient solutions were of course those arrived at by the people who lived on a site and knew what its constraints and advantages were. Each had his own unique situation to deal with. As a result the urban environment became a huge laboratory for trying out a vast variety of solutions. When others saw that a solution worked, they adopted it too and in the process improved on it. In this way, the accretion of decisions that came to govern each property became the generator of affordable innovative solutions. In contemporary cities, in contrast, municipal rules and regulations have produced organized environments that are not based on such an accretion of decisions and that involve neither the social bonds nor the user’s contribution to the conventions of creating space.

In the past, then, the principles governing the actions of property owners led to the development of better solutions which in turn refined the conventions. When an owner decided to make a change, he did not ask for permission, but simply made the change. Only if the neighbors made a complaint was there a judgment as to whether the change should be permitted. When a judge ruled against a property owner, he only told him what he could not do. How he obeyed the ruling and how it affected his house were his problem. Owners gained experience in building from these critical situations, and this added to the store of solutions as well.

Building materials and their assembly were also generated by builders and users in response to particular technical problems. Unlike users, however, builders were controlled by an authority. One of the duties of the muhtasib, or market inspector, in a traditional city was to control the manufacture of building materials and keep builders from cheating users and owners. Manuals of hisbah are full of these regulations. But society controlled building only insofar as it concerned materials and their assembly; it did not interfere in the organization of spaces. The two, one controlled and one not, combined to form a type which was adaptable to all sorts of situations including those created by rights of precedence while still resulting in a homogeneous but adaptable environment.

That it was adaptable can be seen by visiting any traditional quarter today and seeing the many different crafts and other businesses housed in the same type of building. Goitein remarked that almost any function could be found in any quarter of Fustat—a street of cobblers could still include some perfumers’ shops; a
physician might have a sugar refinery in his house.\textsuperscript{40} The historian al-Maqrizi (d. 1441) tells us that the quarter that housed the Khan al-Warrqa (the caravanserai of the stationers) also had a mill and some houses. He described other houses transformed into schools or monasteries, a market that had dwellings in its upper floors, and another for selling books that was turned into a tannery. All this evidence tells us that function was regarded as a variable and not as essential to the construction of a building.

When we talk about a type or about a convention that generated a type, we are not talking about function but only about spaces that are arranged according to certain rules. The functions can always change; function is the variable within the form. Today, in contrast, designers start with the function and tailor the form to fit it. Even those who argue that “function should follow form” are talking in terms of a single function. They do not explore forms to find what different functions they might fulfill, nor do they deal with functions as variables. We need to explore the potential forms have and improve the conventions that generate the forms rather than relying solely upon functionalism. I do not think that function should follow form or vice versa, but I do believe that functions should fit into forms.

Any architect can easily arrange the furniture in his apartment on a drawing board, but when he actually moves in he spends a great deal more time rearranging it because the situation is real. Accretion of decisions as a design strategy has a distinct advantage: each decision made is comparatively small and based on the realistic constraints of the site by those who experience the realistic constraints of the site; it is no longer hypothetical as it was on the board. The only drawback to accretion of decisions is that it is so very intricate and interconnected. Once it has been broken no one can put it back together again.

In today’s large schemes, some initial decisions are realistic, but what follows is necessarily hypothetical, since the effects of each stage will not be known until after it is built. The larger the scheme, the more obscure the reality of the constraints becomes and the less realistic the ultimate design will be. Accretion of decisions, on the other hand, means a small number of decisions according to established conventions of form making.

The most promising path leading to an efficient adaptable environment lies in investigating the potential of forms by improving the conventions for creating spaces. Functions should become a variable; the conventions related to building materials and their assembly should be improved. Accretion of decisions means the applications of these conventions by users on smaller levels of scale. But these conventions should not be imposed on users but explored by professionals to be adapted by them. Design should be viewed as a process that involves social interactions among users, for users can contribute to its improvement on all levels. But this will involve a total about-face in current design philosophies and municipal policies.

Notes

1. This argument is summarized in my forthcoming Crisis in the Built Environment: The Case of the Muslim City (Singapore: Concept Media, 1988).


3. The hotel cost approximately £200,000,000. It was built on the sultan’s orders to house the Gulf Co-operation Council conferences and to act as a guest palace (Interior Design [London], July-August 1986, p 40).


6. Ibn Habib (d. 940) explains that no darar means that no person should harm another person, while no di‘a‘ means no person should be harmed by others; al-Wanshariisi, al-Mi‘yar al-Mu’tab, 12 vols., Ministry of Endowments and Islamic Affairs, Morocco (s.l., 1981), vol. 9, p. 46.


8. Many cases were reported where the second person was asked to adjust; Ibn al-Rami adds that no jurists ruled differently, “Kitab al-Ilan,” pp. 315-16.

9. Ibid., p. 408; see also al-Wanshariisi, al-Mi‘yar al-Mu’tab, 9:60.


11. For detail of visual damage, see Akban, Crisis in the Built Environment, chaps. 5-6.

12. Ibn al-Rami related that this is very common in Tunis, and he did not come across a judge who ruled differently; ibid., p. 314-315.


14. This is derived from Malik’s ruling regarding the blacksmith who hammered iron day and night, while his neighbor, separated from him by only a wall, could find no peace (Ibn al-Rami, “Kitab al-Ilan,” pp. 304-7).

15. Ibn al-Rami relates that the jurists of Toledo used to forbid the kammodin (hammerers) from working if the neighbors protested. The reason for preventing this was that when they all worked at the same time, the sound was very loud. (Ibn al-Rami, “Kitab al-Ilan,” pp. 303, 307; Al-Wanshariisi, al-Mi‘yar al-Mu’tab, 9:60.


18. For example, Ibn al-Qasim was asked about a man who had built a mosque and then built himself a home on its upper floor. He answered that he did not favor this, although the caliph Umar b. Abdul-Aziz (d. 720) used to live in the top of a mosque during the summer in Medina. He added that women would not feel comfortable in such a house because how can a man make love to his wife above a mosque. This example indicates the great degree of freedom that parties enjoyed with respect to using their properties. Suhunun, al-Muaddawmana al-Kuba’, 8 vols. (s.l.: Du‘ al-Fiki Press, 1979), vol. 3, p. 399.

19. For example, A. Y. Hanbali stated that if a change caused damage and neighbors objected as a consequence, then the neighbors would have the right to prevent such action. Abu Ya‘la al-Hanbali, al-Ahkam al-Sultaninya (Cairo, 1966), pp. 301-2. On the other extreme, al-Mawardi from the Shafii rite, stated that the owner of a house had the right to change functions even if its neighbors were damaged and objected (al-Mawardi, al-Ahkam al-Sultaninya (Cairo, 1960), p. 255.

21. For example, a case was brought before Assuyuri involving a person who kept a cow in his house and pounded grain to feed it. The neighbor asked that the pounding be stopped as it would damage his wall, but the cow could remain (al-Wansharisi, *al-Mi‘yar al-Mu‘rab*, 8:445; Ibn al-Rami, “Kitab al-‘Ilan,” pp. 481-82)


25. Ibid, 8:457.


29. For cases, see Ibn al-Rami, “Kitab al-‘Ilan,” pp. 322-23

30. What made the situation worse was that these hotels were the only ones in town and were quite busy (al-Wansharisi, *al-Mi‘yar al-Mu‘rab*, 9:41).

31. The tradition is narrated by Ibn al-Musayyib; Ibn al-Rami, “Kitab al-‘Ilan,” p. 339. Other opinions, e.g., that of Ashbagh, give twenty years as the required period for gaining the right of precedence; the son of Suhunn found four to five years sufficient between neighbors (al-Wansharisi, *al-Mi‘yar al-Mu‘rab*, 9:42)


35. There are many similar cases. Ibn al-Rami, for example, reports a case in Qarawan in which a person tried to stop water from coming into his house from the neighbor’s roof spout. The judge Ibn Talid stopped him; al-Wansharisi, *al-Mi‘yar al-Mu‘rab*, 9:38-39; 8:432-32; Ibn al-Rami, “Kitab al-‘Ilan,” 376-77, 410


38. In *Crisis in the Built Environment*, chap. 8, I argue that centralized policy by states destroys conventions. The fewer the regulations, the stronger the conventions

39. For details, see ibid, chaps. 5 and 8.

40. The Cairo Geniza documents are in Hebrew and date from the tenth through the thirteenth century; they include both official papers and private correspondence. They were analyzed by S. D. Goitein, “Cairo: An Islamic City in the Light of the Geniza Documents,” in *Middle Eastern Cities*, ed. Ira M. Lapidus (Berkeley: University of California Press, 1969), pp. 86-87.
CHAPTER 11

A Typo-Morphological Approach to Design Thinking

Ahmet Gülgönen

Today almost all Islamic cities from Istanbul to Cairo, from Damascus to Rabat, are in a morphological crisis. Most of their old fabric has been either been damaged or has entirely disappeared. With few exceptions the new elements that have replaced it are far from having the same qualities as the ancient cities. New cities and quarters are equally disappointing. Monuments and a few houses are conserved as isolated elements; deprived of their proper context, they lose much of their meaning.

Architecture in these cities is also in the midst of a typological crisis. The old types of houses and institutional buildings that had been used for centuries are now disappearing. The new types that are replacing them have nothing to do with their historical surroundings. In Turkey even the few examples that reproduce the image of the old type do so by using artifically added decorative elements deprived of their raison d'être and by reproducing old plans as stylistic exercises far removed from the types that produced the old urban fabric.

These two phenomena—the disappearance of the old types and the destruction of the old cities—are related. The reasons for them are many, including the emergence of problems on a new scale and structural changes in Islamic societies. But certainly architects must bear much of the responsibility because of their inability to deal with a complex situation and to consider architecture as an existential problem. Architects should have a solid theoretical grounding that includes an understanding of Islamic cities and familiarity with architectural types and urban forms and the connection between them. Instead of treating buildings as isolated objects they should see them as part of the urban fabric. Such an approach will create new conceptual tools for design and a vocabulary for architecture. They are necessary for the design of new buildings as well as for the rehabilitation of the old fabric.

Before going into the architectural types and urban forms in Islamic cultures in detail, some clarification about the uses of architectural types as conceptual tools is in order. The various theoretical works on architectural typology from the eighteenth and nineteenth century were primarily meant to type buildings for architectural inventories, but they also acted as a historical "memory" for the explanation, conception and production of buildings. Before that the city itself served as a marvelous inventory. One can imagine, for example, the importance Istanbul had for architects when they sought to understand the Ottoman mosque type and its relation to the urban form.

Three different kinds of classifications were made depending upon the purpose the architects and theoreticians had in mind. The first is based on the use to which the building is to be put—e.g., mosques, hammams, madrasas, houses, and so forth. The second is based on the formal and spatial characteristics of the buildings
or building type—e.g., courtyard house or central plan. That same criterion can be used to subdivide a classification—e.g., hypostyle mosques or mosques with a central dome. Both systems of classification can be applied to the architecture of different countries as well as different historical periods. They are widely used by designers for reference and inspiration.

The third kind of classification is based on the production of a specific society at a specific moment in history. It provides an excellent foundation for understanding buildings in context since it involves both the urban fabric and its components.

The first two varieties of classification were originally used by French theoreticians but ultimately had great influence on architectural thinking all over the world, spreading from the West to Islamic countries via both local architects educated in Western countries and foreign architects imported from the West. The third approach came mainly from the architects and builders themselves. All of them reflect the ideology and production system of the society. The French theoreticians of the nineteenth century were very much in the service of the architectural production of their time. They did not merely provide inventories, but extracted from them the rules of composition—axiality, symmetry, grids, etc.—that corresponded to the official taste of the Royal Academy. These designs were independent of context; they were meant to be imposed on the environment as a symbol of the power system and its centrality. Modern architecture has inherited that thinking. It too creates abstract objects conceived independently and as a result has been responsible for today’s disintegrated city both in the West and in the Islamic countries where Western thinking about design has been influential.

In Turkish thought, one of the architects who has adopted typological classifications as a conceptual instrument is Sedat Hakki Eldem (fig. 1). He

Figure 1:
The totality of buildings that can result from dividing the square and rectangle and their combination with the circle.
(From Warner Szambien, J. N. L. Durand.)
classified plans of Turkish houses and then generated new plans based on the oda, or room, and the sofa, or space between the rooms. There was a plan without a sofa, another with an inner sofa, with an outer sofa, with a central sofa that corresponds to the type with a central plan. He drew upon the vast geographic space covered by the Ottoman Empire across time so the results were in a sense ahistoric. Though he pointed to regional variations and to evolutions over time, in fact he made these classifications to show a linear development of the plan types. According to him the house with a central plan was the most developed one (fig. 2), and the one he considered to be the ideal plan type. He used it in many of his projects, not only for houses but also for other kinds of buildings (fig. 3). But what is important is that for him the plan remained an abstraction divorced from any context. In the historical evolution of the Turkish house the central plan type was restricted for the most part to konaks, those large mansions situated as isolated objects in private gardens. Combined with their gardens they certainly enriched the urban context, but they had no generative power when it came to designing the city housing lined up along the streets that would contribute to the complex urban fabric.

Another series of typological studies was made of the Ottoman mosque (fig. 4) by Turkish architects and historians to trace the transition from the multidomed mosque of the early period to the central domed mosque that followed. The object of the classification varied from the demonstration of outside influences to the importance of its own sources and its authenticity. What is certain is that the
Figure 3: Turkish house types using a central plan. (From S. H. Eldem, Turk Evi, Osmanlı Dönemi S. H. Eldem.)

Figure 4: The typological evolution of the early Ottoman mosque. (From A. Kuran, The Mosque in Early Ottoman Architecture.)
development of the mosque type with a central dome made the verticality of the main space important, and especially with the hierarchy of the main dome and the semi-domes a new system of space was created. This had particular importance for the morphological transformation of Istanbul after it became the imperial Ottoman capital.

The typological evolution of the Ottoman mosque cannot be fully understood without knowing the morphological reasons behind it and their consequences; the same is true for the Turkish house, which cannot be seen in the abstract but only as a concrete object that is an integral part of the urban fabric.

In spite of regional variations in construction techniques and materials that resulted from local influences, the Turkish house was remarkably persistent in maintaining its essential characteristics. It signaled Turkish settlements and the domination of Ottoman territories. In fact installing Turkish populations on newly conquered territories was part of Ottoman urban policy. Sometimes the houses were superimposed on existing street patterns; sometimes entire new housing quarters with their own streets were constructed. Especially in the latter the streets were characterized by free geometric patterns dictated by topography and circulation. But the ability of the Turkish house type to adapt to any street geometry is remarkable. It is made possible by the use of a geometrically adaptable service floor on the ground level with overhanging projections on the main floor level that allow the plan of the principal living space to remain unchanged since no deformations to fit into the ground space were required (figs. 5-6). Indeed, one of the reasons the Turkish house displayed such continuity lay precisely in this adaptability. While in most circumstances street patterns and urban morphology tend to be more permanent than the architecture, in many Turkish settlements a
union between house type and morphology kept one from predominating over the other.

Studies made in Nigde, a town in Cappadocia, reveal how the housing was adapted to the formation of the streets (figs. 7-8), achieved not only by the adjustable courtyards and ground levels but also by the diversity of house types available for use in fitting them into different circumstances. The study also explains why so many theories see a linearity of evolution in the Turkish house type. The presence of three different types on the same site also shows the complexity of the fabric (figs. 9-11).
On the basis of these Turkish examples we can ask some general questions about Islamic city forms and building types. First, can we talk about the specificity of architectural types and urban morphologies in Islamic cultures? Can one discern common influences on architecture and city form coming from the Islamic religion, in spite of its vast geographic expanse and cultural differences.

The following observations might help lead to answers to these questions. First of all, to determine what influence religion might have had on settlement patterns
and the types of buildings produced, the production of the period preceding conversion to Islam ought to be studied. We know that for many societies pre-Islamic nomadic forms greatly influenced later urban patterns. This is equally true of architecture and its decoration. For example pre-Islamic art and Central Asian motifs can be discerned on the architecture of the Seljuqs.

In his book, *La Mediterranée: L'Espace et l'histoire*, Fernand Braudel explains the adaptation and the assimilation capacities of Islamic societies and shows how they adapted the urban patterns of previous civilizations by superimposing various patterns and by substituting and filling in. The process can be illustrated by looking at Istanbul before and after its conquest by the Turks. The urban structure, including the road system and sacred places, of the Byzantine city served as a basis for its new role as an Islamic imperial city. At the same time, however, new kinds of urban complexes and buildings such as mosques gave it a new silhouette and a new spatiality.
In many cities of the Mediterranean basin the Roman city greatly influenced later settlement patterns. In the Casbah of Algiers, the persistence of the amphitheater form in the subsequent development of the city is a particular striking example (fig. 12).

Another characteristic of the architectural types and urban forms in Islamic cultures derive from social forms, especially the emphasis on privacy and intimacy. On the city scale, the duality of centralized activities in the commercial core and around the Friday mosques, on the one hand, and the private character of the housing, on the other, corresponds to the separation of collective and private spaces. The consequences of this are seen in the articulation of the spaces that constitute public and private domains—in the relationship of the house to the street, for example, and also within the house itself. In the Turkish house the transitions from the outside to the sofa, which represents the collective part of the house, and from the sofa to the odas, which represents the private part of the house, are achieved by the articulation of spaces. As a result, both on the urban scale and at the architectural level, differing degrees of “interiority” are achieved. These transitions from public to private ensure the inseparability of urban forms and architectural types.

One of the influences of privacy that is evident in the architecture are the controlled openings in the walls that limit access by the outside world and create introverted spaces, in contrast to the extroverted architecture that is characteristic of other cultures. As A. Kuran points out, the interior spaces in Seljuq architecture are not expressed at all on the exterior. This introverted character was transformed in Ottoman mosques, however, owing to the introduction of the central dome, which has a different morphological role at the urban scale.

Another characteristic of Islamic types is the way they are integrated into the site and the typography. In Ottoman civic architecture this was done through the use of a basic unit, the cube with a dome. It was not an Ottoman invention, but it found its richest utilization in the Ottoman Empire. Various combinations of the domed cube created a modular architecture that could be used for a variety of institutions—mosques, hammams, madrasas, tombs, etc.—because it was not conceived for a specific function. The combinations varied depending on the building's function, but its presence created an impressive unity for the Ottoman külliye in the urban context (fig. 13). The domed cube was able to adapt to various sites while respecting the typography. In the design of the mosques, the transition
from the main central dome to the periphery was realized by the use of semi-domes and secondary domed cubes. These transitions integrated the mosques into their immediate environment, while at the same time creating the scale that is peculiar to Islamic cities.

In conclusion, we can say that using an approach that takes into consideration the types and morphologies of the past might be of great value. It can produce conceptual tools and make the architectural language richer. It is important to realize that the continuity is not linear. The architect should search for truth and not be distracted by illusions. This requires a total vision of the environment and not just partial solutions to its problems at every scale. It also requires that architecture not be seen as a series of isolated objects but as part of the physical and social context of the city. Only in this way can unity be achieved.
A Search for Architecture
Based on Appropriate Technology

Kamil Khan Mumtaz

I confess that, although I find designing an extremely difficult exercise, I find writing an even more difficult one. In spite of my best efforts, therefore, I have not produced a "paper." I propose only to share with you some observations which I hope will speak to you of one architect living and working in a Muslim society, searching for an architecture that is relevant to its own context, that is, to its actual physical and social environment. I hope to show how a search for an architecture based on appropriate technologies has led to the re-education of the architect himself.

Like so many others of my generation, I was schooled in the theories of the modern movement. Our aesthetics was ruled by scientific logic, and our design methods sought to emulate the efficient systems of the machine age. Again, like so many of us from the Third World, I was also concerned with the problems of underdevelopment. The enormity of the tasks faced by our societies called for innovative solutions. But the machine aesthetic of the International Style was patently irrelevant to industrially primitive economies. We believed our role as architects was to evolve an architecture based on technologies that were appropriate to the climates and economics of our own region.

In the early sixties, I began to experiment with the geometry of forms derived from simple basic units (fig. 1). I had an opportunity to work with Buckminster Fuller and Keith Critchlow in Kumasi, Ghana, and both of them had a very strong

Figure 1:
influence on my own work. I began to experiment with low-cost housing systems (fig. 2), temporary exhibition structures, and even sculpture.

At the same time I was critical of the aberrations of the International Style which reduced the modern movement to a set of cliches and symbols of Westernization and modernity. I therefore deliberately sought to evolve in my own work a form of expression which would not be derivative of Western forms, but would rather be based on available materials, appropriate technologies, and a specific climate. I was convinced that my buildings were thus necessarily regional, and if my brick vaults (fig. 3) were rejected by the community for whom they were designed, I put this down to peasant suspicion of anything new, and not to my own failure to recognize the functional advantages of a flat roof as usable floor space in our climate.

In the late sixties and seventies, I made some posters and other illustrations for peasant and labor organizations. In doing so I became increasingly aware that my work in this field was in some respects inadequate. I needed to learn something from our native popular art, but I was not sure what it was.

Then in 1980 some architecture students, assigned to study current trends among the architects practicing in Lahore, came to interview me. “Do you work in the Western or the indigenous style?,” they asked. I was amused by their naivete. “Why don’t you go and look at some of my buildings,” I replied, “and then you tell me.” So they did, and they came back beaming. It was clear they had seen the light. “Yes sir,” they said, “it’s quite clear. You design in the Western style.”

I was shattered. Obviously something other than form and function immediately identified a building in the popular mind as either “indigenous” or “Western.” Buildings could communicate on a level of which I had been totally unaware.

Then about the same time I received a letter from the Aga Khan inviting me to join the steering committee of the Award for Islamic Architecture. I was
overwhelmed. "What do I know about Islamic architecture?," I thought, and I decided to educate myself. The first book I read was Nader Ardalan and Laleh Bakhtiar's Sense of Unity. It was a revelation. Next, I read Laleh Bakhtiar's Sufi. I was converted. An aspect of my mind and my heart had been touched that I never knew existed. I was prompted to reexamine the cultural expressions of other societies, and in the process began to realize that monumental architecture and higher formers of art in all cultures have always been used to convey abstract ideas. But more significant was the realization that ideas about man and his relationship to the cosmos are essentially the same in all cultures: all of them find their origins in a single source to which everything must ultimately return, and all of them believe that beyond the apparent physical reality is a metaphysical reality, that truth exists within man and around him, that man has both an animal temporal self and a higher potential self, that man's purpose in this life is to attain a knowledge of the truth, and that ultimate knowledge lies in becoming one with the object of one's quest.

While I was working on the competition design for the Data Durba mosque in Lahore (fig. 4), I knew nothing about our traditional attitudes toward architecture, but even then, as I searched for an appropriate text for the inscription, I began to realize that the Quran was no ordinary document. Working hours on end, day after day, on the drawings had been a deeply satisfying experience. It put me in a contemplative frame of mind.

For this mosque we had high hopes of winning the competition, since the President was chairman of the panel and we thought that at least ensured a fair jury. A leading architect of Lahore who saw all the entries told us privately that ours showed the highest standards in design. But then we were told that the President had rejected all the entries, including ours, with the remark that his three-year-old daughter could draw better.

By the time we did the competition design for the Quaid-e-Aazzan Memorial Mosque and Library in Karachi (fig. 5), I had begun to understand some of the essential principles of Islamic architecture. Acquiring a grasp of the theoretical bases had given us the freedom to apply them to a contemporary design problem in
a manner that enabled us to exploit new materials and techniques without being enslaved by the particular forms such as arches, domes, and minarets. I was told by the architect members of the technical committee that they had unanimously agreed to recommend our design to the jury, but the jury included army generals who did not even ask for the technical committee's opinion. Since the generals could not agree on whose favorite should be selected, they declared that none of the entries was up to the mark. They gave the job to a firm owned by the government, whose parent ministry had organized the competition and whose minister and secretary were among the judges.

The library for the Staff College at Quetta (fig. 6) was a limited competition in
which the architects were given the opportunity to present their own work to the army brass. I used the opportunity to educate them in the underlying principles of our great monuments and to show how our design was based on the same concepts. I kept hearing for months afterward how impressed the general headquarters had been by my presentation. But they gave the job to another firm. They did, however, invite us to participate in the competition for the National Memorial (fig. 7). We did so reluctantly, and were naturally surprised when someone from the GHQ phoned to say our design had been selected. In the office we decided it was premature to congratulate ourselves. There must have been some mistake. We did

Figure 6: Quetta, Staff College Library, 1983

Figure 7: Islamabad, National Memorial, 1983
not win competitions. Sure enough, two days later GHQ rang back to say we had indeed won, but so had someone else, so the two of us would have to make another presentation. Two years went by. Then we were told our drawings had been lost. Could we send them another set since the whole matter was under review? Next we read in a newspaper report that there was to be an international competition for the National Memorial. There was no mention of any previous competition.

My design had been based on the traditional paradise garden. I had of course decided to have nothing to do with the new competition, but another firm, against my sincere pleas and advice, prevailed upon me to help them with the entry for it. I thought it would be good for a laugh to resubmit my original design. I am told it came very close to being selected. Several architect friends who were present at the selection stage said they thought it deserved to win. But the minister, an ex-army general presiding over the proceedings, rejected it on the grounds that it would be considered sacrilegious and presumptuous to build a second paradise garden on earth.

I have had better luck with private clients. I have been able to explore new possibilities in familiar materials, using patterns and surface decoration as the grounds for contemplation, which help the viewer to become aware of a reality beyond the immediate materiality of a brick wall (fig. 8), a marble floor (fig. 9), or a steel grille (fig. 10). I have learned to work within the framework of a new discipline of symmetries, proportions, and rhythms which reflect the cosmic order and perfect balance underlying the apparent chaos of the universe. I have been able to evoke the delights of discovering the hidden paradise with internal patios and fountains (figs. 11-12). I have learned much, and continue to learn, from the wisdom and skill of our master craftsmen.

Function and technology are indeed important determinants of built form. But the function of buildings as a means of communication, as vehicles for conveying a message, must be recognized as at times the ultimate determinant of architectural form. An architecture based on appropriate technology will fail to convey its message unless it also employs a language that is appropriate and meaningful in the context of a specific culture.

Figure 8: Lahore, Sani House, 1982.
Figure 9: Lahore, Sani House, 1982. Interior.

Figure 10: Lahore, Nasrat Affendi House, 1986. Grille.

Figure 11: Lahore, Rashid Rahman House, 1986. Interior Courtyard.

Figure 12: Lahore, Nusrat Affendi House, 1986.
ARCHITECTURE
BASED ON
A RESPONSE
TO CLIMATE
Vernacular Architecture and Environmental Response

Mete Turan

Some of you may not consider the kinds of constructions I will be talking about as architecture at all. They are certainly very down-to-earth environments, so down-to-earth that some of them are entirely underground. I will also argue that some phenomena in the environment are neither religion-specific, nor culture-specific, and worst of all, I will end my presentation with a heresy.

The proceedings of the past two days remind me of an anecdote dating from Timurid times. Its protagonist is Nasrid Din Huja, a character in folklore who voices the wisdom of the society. The story goes as follows:

One day a learned stranger comes to the village where Nasrid Din Huja lives, and they immediately ask Huja—he is the only learned person in the village—to meet with this stranger. They meet in the village square. Instead of communicating in words, they start communicating in signs. The stranger draws a circle on the ground with a stick. Huja divides it. The stranger divides it again. And Huja marks off three of the four quarters. After this interchange, the stranger gets up, takes Huja’s hand, and tells Huja that he is the most learned man in the world, and he departs. Naturally everyone is very curious to know what on earth went on. First they follow the stranger and ask him what was said. He responds, “I drew a circle to represent the earth. Huja immediately drew the line to show the equator. Then I drew another line to show that there are other elements on the earth, and Huja pointed out that three quarters of it is water and only one-quarter is land.” Then they went to Huja and asked him what had been going on. He said, “The stranger drew a pie, and I wanted to share it so I cut it in half. I don’t know why he wanted to divide it further, but I said, ‘Dammit, I want three-quarters of it!’ I hope my communication with you this morning will be more fruitful than that interchange.

The three places—Cappadocia, Haran, and Mardin—I will be talking about are all in Anatolia, in a strip about two hundred kilometers wide, extending from central Anatolia down to the Syrian plateau. It is a hot, arid region. The three settlements are quite different from each other. Though they share the heat and aridity, they have responded to them in quite different ways.

Cappadocia has an undulating landscape; it is rocky as a result of volcanic activity, but there are small pockets of arable land in the valleys. It has been inhabited since 3000 B.C., if not earlier. Haran is less interesting; it is extremely flat and its diurnal maximum temperature differences range between 20 and 33 degrees centigrade. The mean relative humidity is about 50 percent and the minimum relative humidity can drop very close to zero. Wind velocity remains the same summer and winter, but the direction changes. The structures people build in Haran are not peculiar to it. They are also found in Syria and most probably elsewhere as well. Their insulation capacity is impressive. Solar radiation is quite high in this
strip and, because of very clear skies, can be a hardship in the summer, though equally a gift in the wintertime. The third settlement, Mardin, is on a very demanding slope. Evidence suggest that Mardin is also over three thousand years old.

Obviously it is not only the environmental conditions that gave form to these three different settlements. Scarcity of arable land was also an important factor in the shaping of these towns, as were defense and social structure.

Some of Cappadocia's settlements were underground. They could be inhabited by as many as 20,000 people, and went down about eight stories—at least the ones that have been excavated go down that far. Neither the temperature nor the relative humidity changed in this environment from season to season. These underground towns included churches, storage spaces, and living accommodations. It is obvious that people did not occupy these underground cities for long periods of time. Although they had ventilation shafts for bringing in fresh air, living eight floors below the ground must nevertheless not have been very easy.

The secluded valleys of Cappadocia, which occupy about 15,000 square kilometers, provided home, food, and safety to the slaves of the Hittites as early as 2000 B.C. Cappadocia represented freedom if the prisoners could escape their captors and take refuge there. Later, in the times when the Christians had to flee the Romans, and still later the Arabs, it once again provided a refuge. They not only built under ground and on top of the hills, as they did in Mardin, but into the rocks. Thus did nature itself become a substitute for building; indeed the two were blended together.

Three very different forms were used in the three regions. The cube or beehive or cupola was used in Haran because the surface-to-volume ratio responded to environmental factors. The lower the ratio of surface to volume, the better it is for heat losses and gains, i.e., it reduces heat loss in cold weather and also reduces heat gains when it is hot. The environment provides maximum exposure to sun, a disadvantage in the hot dry summer day but an advantage in the very cold winters and because of very high diurnal differences between night and day all year round. One small calculation, for instance, that compares building on a slope as they do in Mardin and building on a flat site to the same density shows that the heat required to keep the same indoor temperature actually increases 50 percent on the flat side compared to the sloped side. Therefore both the vertical dissipative flux and collective dissipation as well as affective dissipation are taken care of.

In all three environments the ratio of sensible heat to latent heat is very low. The modified hydrological cycle causes the ratio in urban areas to be higher than in non-urban areas, and this means more energy is lost in settlements on flat plains. Maximum exposure to and protection from the sun is dealt with differently from place to place, but in all of them the amount of shade increases as one moves from exterior to interior, from terrace to courtyard, to iwans and to the interior rooms where daily activity takes place. In Cappadocia the building material is mainly earth. In Haran it is adobe, and in Mardin primarily stone. One common feature among these three materials is that their thermal capacity is very high, and the time lag is very long. The time lag of adobe or stone ranges, depending on thickness, from six to eighteen hours. In Cappadocia, theoretically it could last for several months. The same buildings constructed of baked brick rather than stone would require a 64 percent energy increase to maintain the same indoor temperatures.

Another factor that affects the response of the building to its environment is its microclimatic conditions. For instance, Mardin is settled on a south-facing slope. If one asks the people of Mardin from which direction the wind comes, they immediately point to the plain in front of them, indicating that it comes from the
south. But all the measurements of wind velocity and direction show clearly that
the wind does not come from the south, but mainly from the north. The wind
coming from the north cannot reach the slope itself. It goes all the way down to the
plain. In the summer, all the heated surfaces give off warm air vertically and the
vacuum is taken up by slightly cooler air coming from the south. In the nighttime
in the summer, the rising air leaves such a vacuum above the surface that the
heavier, cooler air above the town immediately drops. This is known as the
catabatic flow, or downhill flow of cool air, and the inhabitants of Mardin make
very intelligent use of it by building summer sleeping platforms on the terraces
where it will be cool. In the wintertime the eddies on the leeward side, when the
winds are from the south, are calmer, and that of course considerably reduces the
convective dissipation.

Now is a good time to introduce two curious words. The first is “rupiculous,”
which means “living among or inhabiting rocks.” It refers to a genus of bird in
South America which lives in the rocks. If we limit ourselves only to
environmental factors, that is, deduce that everything people build is merely the
most intelligent response to their environment we will be putting ourselves into a
rupiculous situation, which will lead us to a kind of naturalism.

The second word is “bucolic.” It relates to rural life but it goes a little bit
beyond rustic. It also suggests something without artful elaboration. For some of us
these types of environments may not be architecture. They may merely be the best
responses to nature, but I think we should try to remember in our search that this is
not in an asocial context and these were not the only technological things that were
happening.

Here I would like to ask several questions, both theoretical and methodological.
The first concerns the nature of vernacular architecture and passive environmental
response. What is the relation between vernacular architecture and human action?
Should an understanding of the fundamental nature of architecture be derived from
an analysis of the built environment based on passive environmental response? Or
should an evaluation of vernacular architecture be made within the framework of a
theory about human nature? Does vernacular architecture have its own structure,
role, and principles? Or is the knowledge vernacular architecture provides distinct
from that provided by institutionalized architecture or architecture done by a
professional? If the human action involved in the built environment is not real
truth, then does vernacular architecture itself carry values or create them? If
vernacular architecture is simply the accumulation of environmental objectives, do
architectures create values? If it is a methodology, do methodologies create values?
Environmental wisdom I believe can be associated with vernacular architecture,
but has it been? Or has environmental wisdom been able to prescribe moral
standards and environmental values?

The second category of questions involves vernacular architecture and
environmental response in space and time. Are social effects or social ideas the
prime movers in the formation of built environment? Are social and historical
phenomena involved in the production of the built environment sufficient in their
own terms to understand the built environment? Or should one look at the built
environment in terms of an underlying system of structural relations? Is vernacular
architecture an environmental response essentially determined by structural
relations? If so, how does one deal with vernacular architecture in historical terms
since those problems will differ from one historical period to another? Or, how are
historical periods to be distinguished? If environmental response in vernacular
architecture is not determined by structural relations, how does one account for
similarities in examples of vernacular architecture belonging to social and cultural
contexts that are otherwise different, or differences in contexts that are otherwise essentially the same? What are the ideological and political contents of environmental responses? How do social and cultural changes affect the environmental response? Where does the concept of continuity lie with respect to vernacular architecture? Since stipulated definitions do not successfully show the distinctions between the processes of vernacular and architecture proper, can concepts such as property and forms of labor be of help in studying the built environments of past and present cultures and societies in transition?

The third category is vernacular architecture and environmental response as a paradigm, and here I am using “paradigm” totally in a Kuhnian sense—that is, as a conceptual scheme that defines the objects and methods of investigation. To recognize architecture and environmental response as a paradigm, it is first necessary to have some idea, however incomplete, of the nature of vernacular architecture and its interconnectedness in the space/time continuum. Is the built environment a basic form of creativity, or is it just one manifestation among many, such as art and language, of creative capacity? How does it relate to other forms of knowledge? Since vernacular architecture displays environmental wisdom in the sense that it involves an awareness of the environment, is it communicable and teachable? Or can it only be learned by doing? What is the difference between knowledge derived through experience and knowledge derived through design?
THEORIES AND
PRINCIPLES
OF DESIGN IN
CONTEMPORARY
ARCHITECTURE
CHAPTER 14

A Ceremonial Approach to Community Building

A. I. Abdelhalim

My premise here will be that the values of excellence and beauty are needed to overcome the underdevelopment, alienation, and apathy now prevalent in most communities in the Islamic and the developing world. I will also suggest that the central cause of that underdevelopment lies in the separation of the means of production, especially of the built environment, from what is germane to their cultures. Yet in most places cultural mechanisms seem still to exist that are capable of linking the construction of buildings to the culture of the community. The "building ceremony," in which the order of the community is identified, the creative energy of the people is released, and community resources and skills are regenerated, can be such a mechanism.

Until recently rituals and ceremonies have taken place around particular building operations. In many communities today, however, building operations are under the exclusive control of formal institutions such as law and management. Whether recognized through rituals and ceremonies or controlled by law and management, the inner nature of these building operations suggests that a regenerative process similar to that which takes place around life crises, transitions, and growth may also be present.

A class of events in which the process of the community can be regenerated includes the definition of boundaries, the establishment of centers, and the connecting of the building to the community. If the regenerative process of the community is channeled into these building operations, then the building's construction can contribute to the vitality of the people and to the creative development of their community. If removed from the production of the building, the urge for regeneration does not die, but breaks out instead in violence, alienation, or apathy.

In many communities and in a variety of social and economic contexts, I have observed rituals and ceremonies centered on activities considered vital both to the process of building and to the life of the community. The similarity between these events led me to examine the relation between rituals in building and this sense of vitality and regeneration that takes place in them. Building, both in theory and practice, has up to now viewed these instances of regeneration as interruptive and at best as ancillary to the rational process of building.

Over the past few years, I have been using theoretical work as well as actual building to try to examine ways of using building ceremonies as mechanisms that can channel activity into the regular building process. My purpose was to understand whether building ceremonies are a part of building that can be the source of creative action or are simply blind reenactments of traditional rituals. These questions are important because the majority of the world's population live in communities in which custom and tradition are the only available organizing forces. Whether one calls such communities informal, marginal, underdeveloped,
traditional, or primitive, in them any development must fundamentally rely on local abilities and resources. The building ceremony, regardless of the community or culture, is the mechanism that links building with the community.

On the island of Mactan in the Philippines construction day is called *bayanihan*, which means ‘laughter’. In Upper Egypt, the Nubian women of Kushatmaa Garb dig deeply in the soil of the streets to reach a layer of fine sand, which reminds them of the ground in their old village. They move rhythmically, chanting the name of the occasion, as they spread the sand to repair the streets and the floors of their houses. In the fishing community of Kameshima on Wasaka Bay in Japan, the Yoimiya, or “night festival” is held on the second night of August each year. The young people of the community reconstruct a miniature shrine to house the “awakened gods” and carry it to the village. Then the boats, streets, plazas, and buildings are repaired, and platforms are built as resting places for the awakened gods.

Mosque repair in Mali, house decoration in Nubia, barn-raising in rural America, land subdivision in Mexico, community gardening in Niger, roof construction among the Berbers are only a few of the many examples that indicate how building has always been intimately connected to the people and their creative instincts that have produced both buildings and artifacts of great interest. The stark beauty of house decorations in Nubia, the majesty of a mudbrick mosque in Mali are just two examples of the products of these events.

All these instances are indications that a basic regenerative process similar to that which embodied the rituals and ceremonies of many societies and to the vital process which guides the growth and forms the identity of individuals may now in fact be operating in the building process. The fact that a great many societies have devised ceremonies around building—laying the foundation, constructing the main beam, laying the cornerstone, raising the roof, subdividing the land, establishing boundaries, and the sale or exchange of property, for example—suggests this. Today, however, the building ceremony has all but disappeared from building construction. The phrase “building ceremony” in itself suggests some kind of contradiction since building involves construction, finance, and law, while ceremony is associated with ritual, festivity, and regeneration.

Today it is fashionable to argue that building should remain separate from ceremony in the name of economic necessity, efficiency, or rationality. At most an appropriate integration between culture and production must remain on the symbolic level. Such an argument is, however, false and misleading. The integration of culture and production is both essential and possible. Evidence suggests that ceremony increases productivity, improves performance, and enhances the quality of the things that are produced. Building, more than any other productive activity, can combine economic growth with the vitality and creativity of the people and add to the accumulation of capital, knowledge and authority, the regeneration of identity, creative energy and community solidarity.

An actual community building project in Egypt—a cultural park for children near the Ibn Tulun Mosque in Cairo—gave me the opportunity to test out my theories. It well illustrated the advantages of this combination. The park site is a few hundred yards north of the Ibn Tulun Mosque. The project, whose design we were awarded as a result of a national competition held in the fall of 1983, was financed by the Ministry of Culture in Egypt. It included among its facilities, a children’s museum, an open-air theater, a library, playgrounds, and gardens. The site was about two and a half acres with clusters of trees and the remnants of an older park called El-Hod el-Marsoud, which had occupied the site in the late nineteenth century.
Figure 1: The mosque and minaret of Ibn Tulun.

Figure 2: The final scheme for the children's park at al-Sayyida Zaynab.
The community around the project is called al-Sayyida Zaynab. It is one of the oldest, most densely populated, and poorly maintained quarters in Cairo, but also one of the most vibrant and lively. Its population is over a million, and it is rich in history. It is named after Sayyida Zaynab, the granddaughter of the Prophet Muhammad. The mosques of Ibn Tulun and Sayyida Zaynab are among the many great buildings from various periods that embody in their form some of the power, vitality, and meaning of the community's life there. More important than these monuments, however, is the lively festival of Sayyida Zaynab held every year, during which the identity and the culture of the community is reenacted and regenerated.

When we began working on the scheme for the park we concentrated primarily on order. How were we going to conceive its geometry and organization, its images and symbols, in such a way as to capture the community's spirit? We were convinced that a project built right in the heart of the community had the potential to restore its creative capacity. Design on it began five years ago; it is now under
construction. During that time the building and the community were linked in three different ways that obtained varying degrees of success.

Every community has its own concept of order, a way of relating its existence to the universe. In Sayyida Zaynab today, as in many other poor but vital communities, this concept is based on myth and belief but also has its scientific and ideological aspect. Designing in such a community must strike a balance between analysis, abstraction, and rationality, on the one hand, and faith and submission to the community's ideas about order, on the other. We found an expression of the concept of order to be found in ceremonial processions and in the rhythm of the folk dance (zikre) and music, in the structure of the oral poetic tradition, and in a few building rituals such as the foundation sacrifice and the laying of the cornerstone. We also used landmarks—the minaret of Ibn Tulun, the domes of several mausoleums, land patterns—as messages that could reveal something about the configuration of the social order. The configuration of a procession and the structure of poetic rhythm reflect belief and ideology in their relationships in space. The task of the designer is to disentangle these containers of order and discover their underlying geometry.

In our case, the point of departure was to find links between the growth of a child and the growth of the park, and we searched for events, objects, and symbols in the culture that could give this idea expression. The Ibn Tulun minaret was clearly visible from the site, and it too became an inspiration for our order. We reconstructed the spiral form of the minaret in a series of geometric operations constrained by the shape and the elements of the site and organized in terms of the project's requirements. The first formulation involved the movement of two
concentric circles. The center of the first circle is a point at the intersection of the axis of a palm tree promenade on the site, with the main street leading from the entrance to make a significant visual link to the minaret. The center of the second circle was a large tree at the end of the promenade axis. The progression of each movement’s intervals roughly followed the spacing of the palm trees along the two sides of the promenade. Program requirements and the patterns of activities within the different fields defined the final arrangement of the scheme.

A large fountain, modeled after the traditional fountains in Cairo, marked the center of the first area. A small cafe, playgrounds, playing fields, and platforms for observing these activities completed this first area.

Around the center of the second area, a cascade of spiral walls and terraces suggested the setting of the children’s museum. Animals and birds were placed around it. The intersection of the two areas created a third set of geometrical relations where a variety of activities were located. The theater was placed so as to form two interlocking spirals around a triangular group of large Bengali trees. The border between the geometrical order of the park and the surrounding streets and alleys provided a setting for a cafe at the corner, an outdoor fountain and ablution place, a small zawiya and an outdoor prayer area, several shops, workshops, and a very large outdoor community space made by including the alley within the walls.

After the competition awarded the scheme to our firm, a contract was signed for design development and construction, funds were allocated for the building, and then . . . nothing happened. The project had been blocked by political-interest groups in the parliament. Several confrontations with officials, including the prime minister and the minister of culture, resulted in an official go-ahead, but still nothing happened. Something was wrong.
We soon realized what it was. We had been trying to defend the project through public meetings and through the media, but the people in the community, the real supporters of the project, had no contact with either. They were cut off from the press and from the power structure, which in any case were confused about the image of the project and argued against its order and character. We realized we would have to mobilize the community to get the project moving, not just to defend the project but to build it. We looked for an opportunity to do this.

The opportunity came when the Minister of Culture decided to lay the cornerstone of the project during the National Festival for Children, a celebration held in Egypt in November of each year. Some officials, the architect, and representatives of the local community were scheduled to attend.

Normally a cornerstone laying is completely detached from the life of the community, but we proposed to the Minister of Culture that in place of drawings and working models that were usually displayed in a tent on these occasions and which to most people were meaningless, a real life-size model of the scheme could be displayed to give the whole community a glimpse of what the project was to look like. The spiral geometry of the fountain, exhibits, museum, and theater would be constructed in a tent, and the platforms and terraces would be marked on the ground by colors. Each element would be mocked up full scale in its actual place on the site.

In our memorandum to the Minister we also suggested inviting artists, musicians and dancers to participate. They could propose works suggesting the scheme which could then be performed by school children from the local

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We have shown the opposition and the media how the project is being prepared. We have also shown the people in the community how the project is being prepared. We have shown the local government how the project is being prepared. We have shown the whole country how the project is being prepared.

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The base of three domes built according to the model.
community. In this way we sought to restore the age-old function of the building ceremony that had been traditional in Egypt from the Luxor Temple and the mosque of Ibn Tulun almost up to the present day.

The Minister was eventually won over to our scheme, though mainly because the ceremony was to be attended by the President and his wife and would draw attention to the significant role it was playing in the development of local communities. The image of hundreds of children playing and dancing around the mocked-up park and the full-scale model, while tens of thousands of citizens looked on, appealed to the political instincts of the Minister, and he approved. We were given seven days to execute our plans.

We began by making a set of drawings that would enable the tent builders to produce a tent overnight. Tent builders work in two teams of four each. One man works from the top of a very long ladder, which he holds onto with his legs, moving the ladder about like a circus performer. The others on the ground deal with the ropes and spread the canvas over the poles that structure the tent. Our drawings had to follow this method of construction. On the site local officials prepared the grounds for the tents, and contacted schools, artists, and musicians. Within eighteen hours a two-and-a-half-acre lot had been transformed from a deserted, rundown site into a fabulous scene of tents that beautifully, if not altogether accurately, reproduced the arrangement of the proposed scheme. The neighbors hung out of their windows, and peered off of rooftops and out of the tree tops to see the emerging event. Cheers like those heard at weddings and other festivities came from every direction. The children began to arrive to rehearse on the temporary stage that had been set up. For three or four days hundreds of them gathered in groups to practice, while a choreographer and the musicians worked out the performance to follow the configuration of the scheme. When they could not, we changed the scheme’s arrangement. This happened several times and each time it did the scheme was improved. Instead of the original plan disappearing from sight it continued to evolve in front of me. I came actually to believe what I

Figure 10:
Arched opening in the community wall.
had claimed to the minister, that the great buildings of Egypt were always the result of ceremony. Certainly the performance of this festival added something to the plan that rational designing could not have conceived. The action of the community added a sense of wholeness that would otherwise not have been there.

Combining crafts with technology is a difficult operation because it comes into conflict with current modes of building. But in the case of our park it could not be built entirely with modern methods and still involve the entire community as the building festival had done. Working drawings, order forms, spec sheets, and legal documents seemed oddly out of place after the festival. The elements of the scheme remained the same, but the participation of thousands of community members in the festival had introduced ideas and images that would not lend themselves to inclusion in working drawings. Nor would minor modifications remedy the situation. Rather the static geometry of the original had to be transformed into a lively order for which the dimensions and specifications of working drawings were not only limiting but inappropriate. Like any community project, this one had to be capable of retaining its original order while at the same time constantly changing and adapting as the process of building continued.

The central question was how the orthogonal system of measurement and dimension could render the nonorthogonal geometry of our scheme and retain the tremendous variety of space and expression that had turned up in the festival. We devised a system of drawing based on proportions and not on dimensions. The logarithmic spiral which was used to organize the scheme was now developed into a system of proportions based on rhythm and harmonics, which allowed us to develop or change a particular element without loosening the general order.

We selected stone for our construction as best suited to an environment that included the stone and brick construction of the Ibn Tulun mosque and a few Mamluk and Ottoman buildings in the neighborhood and the reinforced concrete of the most of the rest of the buildings. We thought that stone would represent a meeting point for the carpenters, formworkers, steelworkers, and surveyors of the typical Egyptian general contracting crew and any traditional craftsmen who might still be found in the community. The wall-bearing construction we chose utilized arches, vaults, and domes which allowed for freedom and liveliness in the general order.

In Egypt the law requires that publicly financed projects be assigned to general contractors through public bidding. This means that contractor’s crews usually will not include craftsmen. To surmount this difficulty we divided the work up into two categories of operation: ordinary work—including the foundations, damp-proofing, and regular walls—that would strictly adhere to the dictates of the drawings, and extraordinary work—arches, vaults, domes, and curved walls—that would require both technical work and the expertise of craftsmen. For the extraordinary work, we required the technician to prepare a full-scale model of each element, with the craftsmen present to advise on the materials and techniques involved. These models were then used as patterns for carving stone and building vaults and arches. This way we were able to combine the skills of the stoneworker and his instinctive knowledge of geometry and measurement with the technician’s ability to work from written instructions and drawings. The combination also made it easier to introduce innovation. It allowed the craftsmen to rescue lost skills with the aid of the technicians and the technicians to add advanced skills to their ordinary tasks of steel reinforcement and waterproofing. (Incidentally some of them revived the ancient ritual of animal sacrifice before reinforcing some of the foundation.)
Figure 11: The community wall adjusted and built through a system of proportions.

Contractors are supposed to be accountable to the architect who in turn should be accountable to the client. Contractors subcontract out particular jobs to a chain of other subcontractors where the interplay between the technicians and the craftsmen that we had proposed would have been impossible to manage. Public clients, whether government or corporations or cooperatives, are not really interested in construction innovation. Our park was no exception. The bureaucracy had its representative on the site, and this required a basic change in procedure. Instead of the contractor, the architect assumed responsibility for the relation between technicians and craftsmen, and left management in charge of supplies, and the hiring, training, and organization of unskilled labor.

The project is now underway. The community wall has been constructed and the library and bookshops are completed but not yet open. Terraces and playgrounds are still being built. But already the project is starting to trigger other activity. Local vendors both hope they will have a place in it and worry that they will be chased away. Public officials are silent; professionals are divided over the merits of the approach and skeptical about the use of stone and crafts in the context of industrialized building. The press is weary of the whole subject.

Yet we are reassured by the community itself. While it is too early to report on the formal qualities of the park’s buildings and spaces, there is no doubt that it has already forged a link between the activity of building and the culture of the community at Sayyida Zaynab.
CHAPTER 15

Historical References and Contemporary Design

Raseem Badran

Through two of the recent designs of our firm Shubeilat Badran Associates of Amman, Jordan—the State Mosque of Baghdad and the Grand Mosque of Riyadh—I will attempt to address the question of how contemporary design practice can make use of the cultural heritage of a society and still meet the requirements of contemporary life.

Figure 1: Baghdad State Mosque. Site Plan
Turning first to the State Mosque of Baghdad, the client was the Municipality of Baghdad represented by the Iraqi architect Rifat Chadirji, whose administrative and organizational abilities proved to be outstanding. The program presented by the client reflected an intent that was more clearly political than it was religious or even social. The municipality had in mind a mosque that would at the same time be a landmark and an expression of technological achievement. It invited architects from a range of cultures to submit their designs so that the client would have a variety of proposed schemes.

Figure 3: Baghdad State Mosque. Model showing housing rotating from the mosque precinct to emphasize its axiality to Mecca.
When we began our work we had little knowledge of the architectural heritage of Iraq. Our familiarity with it was more or less limited to structures such as Mesopotamian ziggurats and Abbasid monuments like the great mosque at Samarra. The client was extremely helpful in introducing us to examples of the Iraqi Islamic heritage including the madrasa al-Mustansiriyya, the Khan Murjan, and other buildings that represented the monumentality they were seeking.

The topography of Iraq is flat, with rivers and palm trees, very different from the hilly terrain I was accustomed to in Jordan. The countryside had both a distinct building material and a typical composition and color that gave Iraqi architecture its character and which I had to understand and absorb if I was to design appropriately for that country.

The designated site was suburban, presumably to allow sufficient space for the monumental statement the client sought, though at the same time it was certainly in direct contrast to the tradition of the mosque as a social and urban institution. The spatial requirements were vast. The specifications called for an indoor prayer space to accommodate 30,000 worshipers and an outdoor space for 15,000 to 20,000 worshipers. The two spaces combined would have been sufficient for an airfield.

To counteract the colossal impression these requirements would make we decided to provide an urban texture and character to the project. Such an approach would also help to make up for the building's isolation. We used the buildings required for the mosque's ancillary functions to provide a composition that approximated that of a city. The complex was conceived as an urban cluster with the symbolic elements of dome and minaret suggesting the skyline of a traditional town. The housing required we made as a separate cluster juxtaposed to the mosque but rotated in a way that emphasized its axiality to Mecca. Landscaping that included palm trees, water, and patterned pavements was also used in a way that would help generate an impression of an Iraqi environment, while at the same
time appealing to all worshipers, regardless of their racial, social, or cultural backgrounds.

To define the space we studied examples of traditional mosques to discover the various ways they were devised to accommodate a large number of worshipers. Their basic organizational elements—courtyard, prayer hall, and so forth—were employed in our solution, but deployed in a somewhat different way. To overcome the problems posed by the colossal scale of the mosque a gridded geometric network was used to order the mosque's space. The volumes of the mosque and its ancillary functions were deconstructed into repetitive spatial modules grouped within this network and separated by strips that housed services such as ventilation and lighting and which contributed as well to the landscaping and the floor pattern.

We designed a sloping earth mound reminiscent of the base of a Mesopotamian ziggurat both to frame the mosque and to conceal about a third of its height. It also serves as a transition between the outside parking area and the prayer hall. A space similar to the ziyada of the Ibn Tulun mosque houses the ablution facilities, the kitchen, and other utilities.

Inside we used the traditional system of arcades of the hypostyle mosque to organize the rows of worshipers and define the direction toward Mecca. It gave a richness to the hall and simultaneously defined two kinds of space, the first personal in scale for small groups (e.g., teacher and students) between the columns of a single module, and the other the collective monumental space that spans the whole mosque. The double arches of the frames formed an intermediate space rather like that in the Khan Murjan, which was used for ventilation and natural

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*Figure 5: Baghdad State Mosque. The volume and ancillary functions were deconstructed into repetitive spatial modules to help define service spaces.*
lighting. Tie beams, primarily structural members, but used also to hang acoustic and lighting fixtures, helped reduce the vertical scale of the mosque so as not to overwhelm the worshiper.

On the outside as well, we found techniques to scale down the monumental dimensions of the mosque by splitting it up into relatively small modular units. On and between them we utilized slit-Abbasid arches, Samarra-like towers, and side entrances to break up the surface and enhance the character of the complex as an urban cluster. By seeking to make the impression of a human settlement we thought to counteract the monumentality called for by the program.

Though traditional forms were often used, they were modified to meet contemporary requirements and to convey fresh meanings. The dome represents a dialogue between the architect and the form's functional, historical, and symbolic meanings. Muqarnas also was used in the traditional functional and structural way but upgraded using modern building technology to support the huge dome. The treatment of the minaret was borrowed from Samarra. The arches were derived from the Abbasid style, but again were incorporated within a modern structural system. The clusters of four columns each that housed the ventilation and lighting system were inspired by the piers found in the mosque of Ibn Tulun. The gates of Ukhaidir inspired the mosque's portal. Finally the fired brick which is a local material was adopted in both the structural work and the cladding. Because it dictated regional formal characteristics by its very nature, it too formed an element of continuity between contemporary architecture and regional building traditions.

Figure 6: Baghdad State Mosque. Interior of the prayer hall showing double arches formed to provide natural lighting and ventilation.
Figure 7: Baghdad State Mosque. Muqarnas on which the huge dome rests.

Figure 8: Baghdad State Mosque. Sketch showing the scale and location of the dome in the center of the prayer hall.
When the design was completed we subjected it to severe scrutiny and criticism. We decided that our way of linking the residential cluster with the surrounding fabric was rather weak, and that the mosque’s location and boundaries needed revision. We also realized that the palm trees we had used would not provide sufficient shade for parked cars in this intensely hot climate.

We found a conflict between our design of the courtyard as a space for circulation connecting the ancillary functions (library, school, lecture rooms) and its proper function as a quiet and intimate space. In addition, both the volumetric composition of the other functions and even the gridded floor gave what should have been an introverted and autonomous space an inappropriate theatrical quality.

The exaggerated and repeated use of the tie beams inside the mosque, although intended to humanize the scale, in practice served only to disrupt the collective identity of the prayer hall and eliminate the sense of the orientation toward Mecca. A more controlled deployment of the tie beams in a single direction would perhaps overcome that drawback.

The idea of using the sloping earth mound, the ziggurat base, to reduce the scale of the building introduced an image and symbolic meaning that was out of keeping with the religious meaning of a mosque because of the ziggurat’s connection with temples and idols. The situation can be remedied either by transforming the earth mound into a freer form or by replacing it with a transitional wall along the lines of the ziyada at Ibn Tulun. The scale of the dome and its location in the middle of the prayer hall, though a natural outcome of the geometric system we used, disturbed the directionality of the prayer hall, since one of the reasons for using a dome in a traditional mosque is to define the mihrab space. Using multiple domes to fragment the mosque into repetitive modular units also detracted from the overall symbolic identity, which could have been more successfully achieved with a continuous planar façade. The many domes made unclear the functions they were symbolizing.

Figure 9: Baghdad State Mosque: Sketch showing the various domes used in the overall scheme.
The second project I should like to present today is the Jami' Masjid, or Great Mosque, which our firm designed for the Justice Palace District in Riyadh. Again our client was a municipal body, this time the Riyadh Development Authority. They too compiled documentation for the architects that was admirably presented. This time it also showed an awareness of the historical function of the mosque as an urban center. The clients insisted that the architect be a believer in the Islamic faith and a practitioner of Islamic culture. This common bond of faith and culture ensured extraordinary dedication and involvement on both sides, overcame the constraints of time and bureaucracy, and enhanced the quality of the design.

Generally speaking the Gulf states commonly suffer from an overemphasis on consumerism and an infatuation with contemporary Western styles and practices in architecture, as in other things. These attitudes have spilled over into Saudi mosque architecture which often displays alien architectural styles devoid of authentic religious, historical, or regional substance. Fortunately, however, Riyadh is in the Najd, a region whose traditional environment is still intact. Its architecture is mainly mudbrick, used either as a structural material or as facing for masonry structures, appropriate for the dry and very hot climate. Islamic customs, habits, and values are also still very much a part of local life.

The site is in the very heart of the old city. The new mosque is to replace the existing Qasr al-Hakim mosque, which was itself built on the ruins of the King Abdulaziz mosque. In addition to the mosque itself, the project includes the Justice Palace (Qasr al-Hakim), and a cultural center. Its purpose is to provide a focus for the city that will at the same time be integrated into the surrounding urban and social fabric, with the help of structures such as shops, public services, and educational institutions.

The program required a mosque much larger than the existing one, but because the site was already surrounded by overwhelmingly high buildings this requirement posed no problems of scale. The existing mosque services 9,000 worshipers; the new one was to accommodate 14,000 in the indoor prayer hall and another 6,000 in the outdoor courtyard. The program also called for commercial

Figure 10: Jami' Masjid, Riyadh. Conceptual sketch showing mosque plan and urban setting.
buildings, schools, residences for the imams, and facilities to house some semigovernmental religious institutions.

In our design we relied heavily on our experience with the Baghdad project. We formed a geometric network using a series of repeated post-and-lintel arcades that ran parallel to the direction of the qibla. The system is reminiscent of that used in many of the local traditional mosques, including the al-Diriya mosque. Using an arcade system for the mosque also had the advantage of being appropriate for a large mosque because it adds human scale and breaks the space into smaller spaces convenient for human gatherings, a lesson we had learned in Baghdad. Because of its size and the density of the surrounding urban fabric the hall was equipped with
several entryways, distributed to achieve a strong axial and visual relationship with the main gates of the Justice Palace and the cultural center to unite the three into a single unit.

We allowed light in through the roof using a construction similar both to local buildings and to our design for the state mosque of Baghdad.

The riwaq, a common element in the region, provided a roofless screen which articulates the various components of the complex and provides a smooth
transition between the large volume of the mosque and the pedestrian scale. Locating the residential and ancillary facilities on the periphery also helped achieve a successful transition.

Because in this region domes are associated solely with tombs and mausolea, we did not use a dome in our mosque design, but replaced it with light effects over the mihrab. We designed two minarets to act as landmarks identifying the city center and marking the direction of Mecca. The outside of the buildings are plain, with high small openings, as are all traditional buildings in that part of the country, in order to retain privacy and protect the people from the harsh climate.

Time did not allow us to do all the research we would have liked for this building, though fortunately we were able to make up for some of this when we turned to the Justice Palace. This we designed in terms of the historical relationship between the mosque and the ruler’s palace, which were always placed together to show that the mosque was the source of legislation and the ruler’s inspiration, just as the madrasa was associated with the mosque to show that its purpose was to educate society in ethical and spiritual values.

I hope that the design for this project will represent an improvement over the Baghdad mosque in the direction of reestablishing harmony between today’s Islamic society and its architecture. In addition to local structure and materials we also made use of the handicrafts, decoration, and building elements such as wooden roofs, doors, windows, columns, walls and colors in the buildings. We hope the final outcome will demonstrate the advantages of the local architectural heritage over foreign imports that have made the Arab Muslim isolated from his own surroundings. The design respects the environment and seeks a solution derived from our sense of the timeless human qualities of Islamic civilization.
ARCHITECTURE
RELATED
TO NEW
PROGRAMS
AND SCALES
Designing the Aga Khan Medical Complex

My intention here is to describe the process by which we arrived at the design for the Aga Khan Medical University and Hospital Complex in Karachi, Pakistan (fig. 1). I want to explain how we conceived of scale in terms of human activity and how we expressed that activity in both building form and architectural detail.

The Aga Khan complex consists of a 721-bed hospital, a medical school for 500 students, a school of nursing, housing for staff and students, and a mosque, built on a sixty-five acre site just outside Karachi. It was designed in 1972-73; construction was completed in 1985. To give you some idea of its size in relation to comparable Western institutions, Massachusetts General in Boston is a 1,080-bed hospital, and the Johns Hopkins in Baltimore is a 940-bed hospital. So this one was within range of some of our largest. Yet Western medicine is very new to Pakistan.

The challenge we confronted was how to introduce a Western institution into an Islamic culture that had no tradition of technologically oriented medicine. Under those circumstances, the architect assumes the role of cultural innovator along with that of builder. We began with questions. How do cultural patterns influence spatial organization? What is the tradition of a hospital or a medical school in an Islamic culture? What are the essential functions of a hospital? A medical school? A nursing school? How must they work together? How will the expectations of the

Figure 1: Aga Khan Medical University and Hospital complex, Karachi. External view showing roof forms and wind scoops.
culture affect the juxtapositioning of critical functions. How do traditional building technologies influence design? Could we produce the ambiance of a traditionally crafted environment using modern construction techniques? In short, we looked at behavioral patterns to find the cultural elements that could be utilized to allow a new building type to fit into the community, even though no historical precedent existed. As architects, we had to discover in human activities those details of history, climate, environment, and symbolism that would encourage the people of Karachi to find something familiar in the new form.

Each culture has different architectural standards. A Muslim views the built environment as an extension of the natural environment, in harmony rather than in discord with it. The qualities valued in traditional Islamic architecture are wisdom, craftsmanship, unity, integration, and respect for nature. As architects, it was our job to discover a new synthesis in the design, construction, and landscaping of a facility housing a Western educational institution.

We began by learning about Islamic hospitals. We learned that the earliest hospital was built in Syria by Caliph al-Wahid in 707. Eighty years later the Caliph of Baghdad Haroun al-Rashid attached a college (madrasa) to every mosque and a hospital to every college. From its earliest inception, the college, hospital, and mosque were linked. Teaching and the advancement of medicine were seen as integral parts of a hospital’s function. By the twelfth century, hospitals were in use throughout the Islamic world and made their way to Europe by way of the Crusaders, who marveled at these “new” institutions.

The design team visited several of the major historic sites in Spain, North Africa, and Turkey. We studied how buildings were developed in earlier times and how they are used today. We looked at the buildings of some of the great Islamic architects. We learned about the values a “successful” building was supposed to express. We studied old Islamic designs, analyzed building techniques, and the traditional work of artisans. We looked at indigenous building forms, the geometry of courtyards, and the impact of natural forces on design. We studied building placement in relation to the sun and the wind. We looked at entrances and passageways and the use of water. We looked at color and texture and what was cooling and comforting in a desert climate. That process of discovery was the soul of the design process. The results freed us from some of our Western assumptions about what a hospital ought to be.

Michelangelo once remarked that he did not so much create the David as discover the block of marble that contained the David within it. In much the same spirit we did not so much create a design for the Aga Khan complex as we discovered it within the traditions and cultures of the people of Pakistan.

Westerners conceptualize a building by standing on the outside and viewing it from a distance—a piece of sculpture in space. Muslims perceive the identity of a building in the arrangement of interior spaces. They experience architecture in the interplay of space with natural elements.

Take entrances for example. In the West, an entrance to an office building is usually a revolving door leading into an elevator lobby. It contains no mystery or sequence of experiences. In the Islamic world the entrance is both physical and metaphysical. It is a symbol of what is yet to be experienced. Within a paradigm of continuous spaces, the entry signals the dynamic of the building’s totality: transition, entry, arrival, passage through. The entry signifies place and time and symbolizes the beginning of an esthetic experience. In the past entrance portals were often the only means by which mosques could be distinguished from markets and other buildings, and therefore their doorways always received very special volumetric treatment and surface design.
The entry we designed for the Aga Khan complex (fig. 2) exemplifies the essence of a new synthesis of cultural experience using modern rectilinear reinforced-concrete post-and-beam construction. The calligraphic border design inscribes verses from the Quran in marble. The ornamental bronze gates at the entrance and throughout the complex are decorated with verses from the Quran in metal. While Westerners might view this kind of decoration as surface ornamentation, the Muslims see it as the spiritual values of their culture integrated into the design.

But what does all this have to do with a hospital complex and teaching institutions? A modern hospital imposes its own functional requirements and technological complexities, which in the West are usually been placed in a high-rise building. The assumption is that the most efficient hospital model is one where elevators link the upper floors of wards with the middle floors of labs, clinics, and operating rooms, and the lower floors of support services such as laundry, kitchens, and storage. However, when we look at the specific activities that go on in a hospital, we find that they are actually small scale and consist of diagnosis and treatment involving a patient, a doctor, a nurse, and a piece of equipment. None of these individual activities demand a particular building form. We put hospitals in high-rise buildings because in our culture high-rise is synonymous with important. Since we experience a building as an external object in space, a skyscraper must be an important building.

Having examined our attachment to the vertical structure, we reviewed some of the technological biases of our culture. We learned that even in our own culture when hospitals become too high-tech, people retreat from them. When maternity wards and obstetrical units became too technologically oriented, for example, we saw a revival of home births. Then we began to design birthing units in hospitals.

In Karachi, as in Boston or any place else, people are often under great stress when they go to a hospital, and they seek comfort and reassurance in their
surroundings. Comfort derives from familiarity. We could not adapt our design for an American hospital and put it in Karachi. We had to discover traditional elements which, while used in a new way, would elicit an impulse of recognition. Although a great deal of attention has been given to our "horizontal design," the issue we confronted was not whether this would be a vertical or horizontal solution, but how to design a health-care facility that expressed our concern about the people using the building.

The hospital building we came up with is three stories high and set back from the road to minimize noise. It is designed to house the most advanced technological equipment and activities. The patient wards are located in another building within easy reach of the main hospital and connected by a corridor. The medical college is sited to allow an integral relationship with the hospital.

The dimensional issue, then, becomes one of how people interact. Scale is expressed as an issue of sociability, privacy, and technical requirements. We think of medical education as extremely complex. Yet the basic form of education has not varied in the last several hundred years. The ratio of students to professors is not all that different. Education still depends on interaction between individual students and the lecturer. We may have designed a large lecture hall with rear image projection equipment, but the critical element is the human activity which takes place in that hall. Again I want to emphasis my focus on dimension as a result of human activity rather than on any particular building type.

Some of the technologies that influenced spatial organization and surface form treatment were our adaptations of traditional climate control. Techniques of passive climate control—the brise-soleil, wind scoops, courtyard design, landscaping, and wall mass—allowed us to dilute the building's dependence on Western technologies such as air conditioning. The resulting forms provide unity with nature and a link with tradition. The sloped roof and integrated air scoops, which are a traditional feature of buildings in the region, capture the breeze that travels over the buildings and help to cool the spaces beneath. Dormitory rooms, classrooms, patient rooms, and administrative offices are all connected by open corridors which allow for natural ventilation. The terra cotta brise-soleil or jali block screens provide shade, breeze, and privacy. They are another example of a design solution which arose from cultural and environmental requirements. Although the teak jalies resemble handwork, they were made using a semi-industrialized process worked out by the design team in collaboration with local craftsmen (fig. 3). Windows facing the sun were recessed and angled so that the

![Figure 3: Jali block screen](image-url)
overhang would shade the window and capture the breeze for air circulation (fig. 4). Walls were constructed of massive double-insulated concrete blocks. By varying building placement, we were able to affect wind velocity significantly and capture prevailing breezes (fig. 5). Varying roofline height affects wind speed and internal building temperature. In addition to its environmental effect, the variations in placement and roof height give a dynamic silhouette to the skyline creating a cultural resonance with traditional desert cities.

Figure 4: Captured breezes cool the building; the overhang shades the windows.

Figure 5: Building orientation and placement can modulate the direction and intensity of the wind.
Water is an important element in Islamic culture both for its cooling properties and as a symbol. In the courtyards it helps to establish an environment of tranquility for private contemplation. But fountains and pools are not just visually pleasing and restful; they also make effective climate-control elements (fig. 6).

Marble, a building material used throughout the complex, was entirely cut, polished, and finished in Pakistan. Marble artisans came to the site to match the grain and color and code the stones for placement.

A continuously corrugated plaster surface (weeping plaster), applied by hand with cement slurry, increases surface shade and reduces glare. In regional buildings, it is often painted, but to make it more permanent we added a natural pigment so that it would not require painting. We selected the pigment color to blend with the reddish desert soil so that the collection of surface dust would not be noticeable (fig. 7).
Throughout is an extensive network of courtyards linking the buildings of the complex, with landscaping using appropriate desert vegetation. They are visually pleasing and relaxing, and are also effective climate-control elements (fig. 8).

The key challenge we faced in designing the Aga Khan Medical complex was how we as Western architects could use post, beam, and slab construction in a way that would find its link with Islamic culture. We had to set aside theories of how a modern hospital must be designed in order to discover the indigenous visual and cultural vocabulary of the country. We had to integrate that vocabulary into a medical institution which had limited historical parallels within the culture. Finally we had to blend economical building technologies with the recruiting and retraining of regional artisans and craftsmen to apply their skills in modern construction methods.

The contemporary architectural vocabulary in Karachi is derived from the economical post, beam, and slab construction. Buildings with rectangular
geometric forms and crisp lines are going up everywhere. What is missing is the sense of beauty and rhythm and order that was the architect's traditional mission for Islamic buildings.

Buildings alone are not architecture. We see too much designer architecture isolated from its historic fabric. Architecture is an attitude toward human activity. It should express more about the people who use a building than it does about you and me. It finds its forms in the characteristics of the site, in the direction of the sun, in the prevailing breezes, in the vitality of nature and human interaction. Each building design emerges from its own context and use. It is discovered.
Over the last three days we have heard a diverse range of presentations on the theme of our symposium, from scholarly papers on historical exemplars—how and why they were built and so on—to spontaneous presentations of the work of contemporary architects by the architects themselves. But by this time, coming as we are to the end of our meeting, the underlying dilemma of our theme has become very clear. It is that no matter how fitting the forms of architecture in Islamic societies might have been to earlier times—and our historian friends have convincing shown us just how fitting they were—that does not necessarily mean that they are any more relevant than any other to those societies in the fast-developing world of today.

I address this problem not as a historian, or from any purely academic or theoretical viewpoint, but as an educator and critic who has had to deal for some years in the field, as it were, and with the consequences of this dilemma. I should add that as a non-Muslim Westerner my views can only be taken for what they are: those of an "outsider," who believes that it is in the West's own interests to learn as much as possible from the experiences of other peoples and cultures. One way or the other, we are all suffering from some kind of "future shock," to borrow Alvin Toffler's apt phrase, and we can only benefit from sharing our problems in trying to deal with a pace of change which threatens to overwhelm us all.

Having said that, I must add that on the whole I am optimistic, and believe that substantial and worthwhile bridges between the present and the past can be built—indeed have already been built by some architects—but that we shall be able to profit from these unfortunately rare examples only if certain widespread misunderstandings are put to rest. The first of these is the assumption that the contemporary problem of cultural interaction, by which traditional Muslim cultures are exposed to the influence of non-Muslim—meaning now mainly Western—cultures is somehow new. The pace of change is new, that is true, but the process of cultural exchange is as old as Islam itself. Our historians are of course well aware of this. The spread of Islam westwards around the Mediterranean is a story rich in cultural cross-fertilization, involving both the assimilation of Roman and other culture forms and the generation of new forms as a result of the need to accommodate the religion and way of life of Muslims. It is hard, for example, to ignore the influence of Roman models, in particular the basilica-forum complex, on the evolution of the hypostyle mosque (fig. 1), notwithstanding the inspiration of the Prophet's own courtyard house as a place for community worship.

But familiar as this process of assimilation is amongst historians, the lessons to be drawn for today's problems of cultural exchange do not seem to attract much attention. If I may refer to just one example from this conference, we heard a splendid account from Professor Kuran of the development of Ottoman classical
mosques, some of which were built by the renowned Sinan. Yet for all his erudition, Professor Kuran made no mention in his talk of a very important factor in the evolution of those mosques—that the principle model on which they were based was the Roman Pantheon. Only when I buttonholed the Professor in later conversation did we get at the truth of the matter. Yes, there was the same centralized space topped by a great dome and fronted by a portico, but where the dome of the Pantheon sat on a drum, the dome of the Turkish mosques sat on square enclosures. So here we have a perfect example of cultural exchange. The basic arrangement might be Western, but as Professor Kuran pointed out to me, the circular dome resting on a cube is an invention of the East. What is most important, I would add, is that the final result is something that did not exist in quite the same form before in either East or West, and in that sense is something new.

This sort of thing seems to me to be of vital importance to the theme of our symposium. Yet, with due respect, only after our conversation and in later debate did Professor Kuran home in on the heart of the matter: “It is not what is imported that matters,” he said, “it is what you do with it.” Indeed, I would go further to say that what is Islamic or Turkish in these mosques is not what we see but, more accurately, the difference between what was imported and what we see.

Yet if it is so important, as Professor Kuran has also now confirmed, why did we hear nothing of this sort either in his own presentation, or in anyone else’s? No doubt historians have plenty of other axes to grind, but my guess is that there is more than one reason. It is true that the Roman influence in Muslim architecture can be and has been exaggerated. In one notorious case an Italian historian went so far as to suggest that the architecture of the Muslim peoples could almost be view as a branch of Western, meaning Roman, architecture. The racist and cultural prejudices implicit in such a viewpoint are now so obvious as to be unworthy of discussion. Yet the contrary viewpoint would seem to deny, or at least be reluctant to admit, the influence of Western models. One reason, I think, is that there is an
understandable need to emphasize what is Islamic or Eastern in those parts of the world occupied by Muslims, as part of a broad process of reasserting the cultural identity of peoples who have been subject to an importation of Western culture on an unprecedented scale.

To a very large extent, the reaction, if I may call it that, is natural and healthy. Such scholarly studies as those carried out by Professor Kuran and the other historians we have heard from are aimed in part at making up for previous neglect, during decades, if not centuries, when all that anyone outside the Western world heard was that “West is best.” Yet there is also a danger that the reaction can become an overreaction, and that the most important point about the nature of regional cultures might be missed: that the processes of global cultural interaction that produced Sinan’s mosques are so common as to be normal.

I first became fully aware of this phenomenon whilst I was teaching in Malaysia, on Penang Island, where it is possible to see the architectural result of one of the richest cultural mixtures to be found anywhere in the world. As a part of that mix, the British Empire had left its usual mark in the colonial architecture of the island, as they had on the Malaysian Peninsula. But what struck me was that Malaysian culture had also very clearly left its mark on what the British had built. I have discussed this particular case at length elsewhere, and since my main subject is architecture in Saudi Arabia, I will only briefly say that the colonial villas of Malaysia (and of Singapore) present a fascinating and very livable mix of imported English and Palladian forms, and forms derived from the Malay houses on stilts that are typical of the region. To me these villas—so well adapted to the tropical climate and suggestive of both local and distant origins—were a revelation (fig. 2).

At its best then, cultural exchanges of this sort can produce hybrid architecture of high artistic and practical quality. I do not pretend that that is always the result—there are plenty of contrary examples—but the fact that they can produce such architecture at all under what one might regard as less than favorable (for the local peoples) geopolitical circumstances surely gives grounds for hope that architects can do better today than they are doing.
This brings me to another reason why I think architecture of this kind, or at least the process of cultural exchange which produced it, has not been fully appreciated. Aside from the political reluctance to concede the significance of “alien” models in shaping regional architecture, I believe there is also a general misunderstanding concerning the nature of the creative process, which leads people to downplay or underestimate the importance of this sort of interaction. I refer to the lingering influence of what I call the “clean sheet” theory of creativity, originally attributed to John Locke and the British school of Empiricists, who believed that knowledge is nothing more nor less than the accumulation of facts, and if you want to discover something new, it is necessary to start without any previous ideas about what it is you are interested in (or start with an “unfurnished room,” as Locke put it; the “room” referred to being the human mind). It is no exaggeration to say that much of the modern movement in architecture was founded upon a related belief that creativity involved the rejection of all precedents, and we are still wrestling with the consequences of that way of thinking.

There is, however, an alternative theory of equally respectable, though more recent, pedigree which suggests precisely the opposite: that nothing comes from nothing. Sometimes referred to as the metaphorical theory of creativity, it is most widely known from Arthur Koestler’s book, The Act of Creation. According to Koestler, a creative act occurs when two or more existing but previously unrelated concepts are connected together in such a way that the joint result is a new idea or way of thinking, much as a metaphor is produced by linking together normally separate ideas so as to produce a new expression: “Plug-in City,” to take an innovative if somewhat remote example. Though I wonder how historians could ever subscribe to the first theory, I also doubt that they are familiar with the second, or with its implications. Otherwise we might have heard more from them here regarding the sorts of cultural exchanges I have been talking about.

I submit, then, that what we refer to as “regional” architecture, whether the architecture of Muslim peoples or not, usually involves creative transformations of the kind generated by interaction between different cultural forms. I should also emphasize that I am not referring here to just exchanges between local and colonial cultures, but cultural interactions of all kinds, whether initiated by trade, pilgrimage, or migration.

If then, instead of insisting on cultural autonomy or purity as a basis for an appreciation of the architecture of Islamic societies, whether of the past or present, we begin by asserting that most, if not all, regional architecture is anything but culturally pure, then I think we may have a much sounder basis for dealing with the sorts of problems architects are faced with in the Islamic world of today. They too must try to relate previously unconnected cultural phenomena, and if we could only regard this as a creative act of the highest order, instead of just a problem to be overcome, then we might see a considerable improvement in the contemporary architecture found in that part of the world.

It is on that more promising basis that I should now like to talk about what it is that my good friend Suha Özkan, who helps run the Aga Khan Award for Architecture from Geneva, asked me to come here to talk about: namely a group of contemporary buildings in Saudi Arabia, most of which involve the design of modern types imported from the West only in the last few decades. All have been nominated for an Aga Khan Award at one time or another, and one of them is an Award winner. So that in itself speaks for their quality. It also speaks for a common aim amongst all the architects concerned. As we know very well by now, the Award has as its fundamental goal the improvement of contemporary architecture in the Islamic world and selects its winners accordingly. In the
Award’s terms that means encouraging architects to produce buildings that are sympathetic to the cultural heritage of Islam, as well as fitted to the functional and technological needs of the times.

Yet this small group of architects between them covers a very wide spectrum of approaches toward their common goal. At one end of the spectrum we have what we might call the tradition-oriented approach, represented by the work of Abdelwahed El-Wakil. At the other end we have the modern approach, represented by the work of Skidmore, Owings and Merrill. The other architects all lie somewhere in between the two extremes, according to which end they lean toward.

Another way of describing the spectrum would be to say that El-Wakil makes direct use of traditional forms, while SOM works indirectly, preferring to draw upon general principles of design. In actual fact, neither approach is entirely separable, each depending upon the other to some extent; that is why both belong together in the same spectrum, or to use the correct jargon, the same “construct dimension.” But one way or the other, all of these architects without exception make some kind of connection between past and present ways of building, and that is their common strength, and their common interest to us.

If we begin with the work of El-Wakil, two recent buildings in Jeddah exemplify his approach. Both are small mosques built on artificial outcrops of land not much bigger than the buildings themselves, jutting out from the Jeddah corniche. As mosques, they also represent the only traditional Islamic building types in the group.

These mosques, like all his buildings, are built with traditional materials and construction techniques, in the craftsmanlike spirit of Hassan Fathy, El-Wakil’s former mentor. Yet for all that, they cannot be explained away simply as copies of historical models, as some critics have tried to do. Certainly it is possible to find plenty of traditional precedents if one analyzes each element and detail separately. But if you look at the totality, what you see is something that at first glance looks traditional and yet is not quite that. Both mosques possess a sculptural quality that is rare in older examples, with their strongly inward orientation. This is no accident. The original commission by Mayor Farsi of Jeddah was for a series of sculptures along the corniche. El-Wakil requested it be changed to the group of three small mosques that have now been built. But even had there been no such commission, the prominent locations would have made their own demands for an outward-looking as well as inward-looking architecture.

In the circumstances, El-Wakil felt compelled to look beyond the buildings of Saudi Arabia or even Cairo, his most frequent source of inspiration, and find additional models elsewhere. He found them, according to his own account, in the whitewashed buildings of the Greek islands. In particular, El-Wakil cites the Paraportiani Church at Mykonos, whose rounded outlines can be clearly seen in the assymetrical forms of the Corniche Mosque (figs. 3a and 3b), conveying a powerful, almost free-form character which belies its tiny size.

The wavy lines of the brick vaults covering the entrance court of the Rewais Mosque (figs. 4a-4c) confirm the movement away from the strict traditions with which El-Wakil is usually associated, as well as echo the sea against which the mosque stands. Only the orthodox forms of the minaret and the three domes over the prayer room qualify what is otherwise El-Wakil’s most modern exercise in mosque design.

El-Wakil’s more recent and much larger mosques in Saudi Arabia reflect an earlier, more conservative approach, however, almost as though the architect were intimidated by the sheer scale of these projects, and sought safer ground again on which to build. It must also be said that this otherwise accomplished architect has
rarely ventured to deal with any but traditional building types, and when he has, such as in the Datsun offices in Jeddah, the result has been disappointing.

Figure 3a: Jeddah, Saudi Arabia, view of Corniche Mosque. Architect: Abdelwahed El-Wakil.

Figure 3b: Jeddah, Saudi Arabia, drawing of Corniche Mosque. Architect: Abdelwahed El-Wakil.
Figure 4a:
Watercolor rendering by Edwin Venn.

Figure 4b:

Figure 4c:
If we want an instructive lesson in how to deal with a new—that is, recently imported—building type in a way that is sympathetic to regional culture and tradition, then we can do no better than begin with Henning Larsen’s Ministry of Foreign Affairs in Riyadh (fig. 5). It is hard to find a more daring example of the transformation of traditional and historic models of architecture in the Islamic world, as well as some familiar Western references, for use in the design of a modern building type. From the outside it looks much like a desert fortress, which was actually one of Larsen’s main sources of reference. As a way of dealing with the harsh climate by looking inward and presenting a more or less closed front to the outside world, it also simulates the traditional dwelling forms of the central Najd region in which it stands.

![Figure 5: Riyadh, Saudi Arabia, Ministry of Foreign Affairs. Architect: Henning Larsen.](image)

The plan of the building reveals another, very different source, however, which is hard to ascertain by either looking at the building or moving through it. When I realized myself that the plan was in fact an adaptation of the plan of the Taj Mahal, I could hardly believe the evidence of my eyes. But without going into detail, I think that the comparative plans shown here of the Ministry of Foreign Affairs, next to that of the Taj, as well as that of the Humayun mausoleum, also at Agra, tell all (fig. 6).

In lesser hands, the idea could have gone wildly wrong. But it did not go wrong. In my view this is one of the great buildings of the late twentieth century, and easily the best of its kind anywhere in the Islamic world. Why? Because the ideal plan of the Taj with its subdivision into quadrants turns out to be the perfect concept for breaking down an otherwise very large building into identifiable units (one quadrant was dropped to fit the building onto the triangular site and to make

![Figure 6: Riyadh, Saudi Arabia, Ministry of Foreign Affairs. Comparison of plan (left) with plans of Taj Mahal (center), and Humayun’s Tomb (right) in Agra, India.](image)
room for special functions). But the high rating is most of all for the quality of the internal public spaces and of the natural light brought into the building down through the roof. I consider myself very fortunate to have been able to spend many days studying this building, wandering through its monumental spaces: the great triangular atrium with its floating roof—a very modern reference to Le Corbusier’s chapel at Ronchamp, and the vaulted internal streets modeled on traditional souks (fig. 7), all illuminated from above with dramatic shafts of light. What an extraordinary mix of references! Yet they all fuse together into a convincing whole. As an office building it also works very well in this part of the world: the small cellular offices with their almost private, domestic character meeting the traditional preferences of Saudi Arabians.

Figure 7:

Riyadh, Saudi Arabia, Ministry of Foreign Affairs. View down one of the "internal streets." Architect: Henning Larsen.

I am told, incidentally, that King Fahd covets the building for a palace. I am not sure that Larsen would go along with the idea, but I think he can take it as a compliment.

The metaphor of the desert fortress emerges again in our next project, which defines roughly the midpoint along our spectrum of approaches to regional architecture. It is the Diplomatic Club in Riyadh (fig. 8) designed by the Riyadh- and London-based firm of Omrania, in conjunction with Frei Otto in Germany. It earns its place at midpoint along the spectrum for leaning equally in both directions. Drawing directly on traditional forms for the oasis concept of an inward looking, fortress-like enclosure of linear buildings protecting recreational gardens
within, it also strikes a very modern pose in the snake-like, free forms of the building. The external tented structures by Frei Otto also suggest regional forms of shelter, as well as making use of the most advanced modern technology in the lightweight, tension-supported fabric roofs. Situated as it is on the edge of a ravine, and finished with the same stone, the sensuous forms of the curved and inclined walls with their protruding tents make a striking addition to the natural landscape of the area.

We next encounter Hellmuth, Obata and Kassabaum’s design for the new campus for King Saud University, on the outskirts of Riyadh. I should mention at the outset that I do not consider this building to belong in the same category as the universities and other centers of learning which formed such an important part of historic tradition in Islamic society. My reason is that the difference in size and complexity, involving special problems of servicing and so on in the case of the contemporary version, is so great as to make the modern university virtually a new building type. The same remark also applies, incidentally, to the modern hospital in the Islamic world, such as the splendid building described at this meeting by the architect Thomas Payette.12

That said, having spent one year of my three years teaching at this new campus, I would like to be able to report more favorably on this building, or rather, complex of buildings, but I find the whole thing very overblown. That is, however, a personal response. My Saudi colleagues felt very differently about it; most of them were very proud of their new university.

It is not hard to understand why. The central space called the Forum (fig. 9), where the two great axes of the campus meet, was well named. Like the Roman model on which it is based, the Forum brings together in one public open space the
main administrative and communal buildings, including the library, auditorium and social amenities, creating a central focal point in what has been conceived of as virtually a small city. But it is the superhuman scale of the covered forum, with its great roof standing on four gigantic columns, one in each corner, that harks back most directly to ancient Rome.

It does the ego good, this sort of thing—makes even a university professor feel important. As an exercise in nation-building, it is also preferable to put up monuments to education rather than to some other institutions I can think of. The problem is mainly with the colleges themselves, where faculty and students spend most of their time. From a distance, the soft brown, irregular cubic forms of the prefabricated concrete buildings have the intended appearance of the mud-brick settlements traditional to the region, except again on a much inflated scale. But inside they more closely resemble a type of large high-school building common in the United States and they are totally reliant on artificial light and on air-conditioning, some rooms having no external exposure at all. The closed nature of the arrangement and uniform interiors also deprive the occupants of any sense of orientation. It took me weeks to learn how to find my own office in one go.

So one wonders if the emphasis has been put in the right place. The same goes for the endless covered walkways along the two main axes (fig. 10). Clearly, they have been designed to impress. The concrete horse-shoe arches which support the roof are also meant to add an Islamic touch. It doesn’t work that way of course. The use of the motif is so different from historical precedent as to give it an altogether different meaning, closer to the Baroque perspectives of Versailles than

Figure 10a:
to anything in the Islamic world. All in all, the campus is essentially Western in spirit, even though it makes regional gestures of a kind.

Moving now decisively towards the modern end of our spectrum, we finish with two projects by SOM. First along the spectrum—because of the very strong visual associations it suggests with regional forms of shelter—is the tented Hajj Terminal by SOM at King Abdulaziz International Airport in Jeddah (fig. 11). As probably the most familiar building in the group, there is little to add to what is already well known. It won a much deserved Aga Khan Award in 1983, not just for Fazlur Khan’s imaginative engineering, but for the skillful and economical way it makes use of natural air movements to maintain comfortable conditions for the tens of thousands of pilgrims passing through each day. The tent fabric is also virtually
maintenance-free, the non-stick teflon coating doing the same thing for dust and
dirt that it does for eggs. But for all the lightweight technology and analogies with
nomadic shelters, it is a monumental structure, almost classical in spirit, with its 45
x 45-meter square grid of steel supports and tent modules providing covers over as
much as 105 acres.

Our last building in the group, the National Commercial Bank in Jeddah (fig.
12), completes the spectrum. Designed by Gordon Bunshaft, it is one of the few
original developments in the evolution of the modern office tower since the same
architect designed the Lever House in New York, back in 1952. As one of the
definitive buildings of the International Style, Lever House spawned countless
glass-clad offspring around the world to help produce the sort of uniform
environment the Aga Khan Award is helping to combat. It is therefore both an
irony and a tribute to the architect’s durable and changing creative energies, that
his last office building before he retired should now be nominated for an Aga Khan
Award.

Figure 12:
Jeddah, Saudi Arabia, National
Commercial Bank, Architect:
Gordon Bunshaft, Skidmore,
Owings and Merrill.

Bunshaft’s geometrical concept is brilliantly simple (fig. 13). By taking a V-
shaped tower based on an equilateral triangle, dividing it up vertically into thirds,
and then twisting the middle third around one turn, as it were, he produced a
triangular tower with two great recesses top and bottom in one side and one in the
middle on another side. These elevated and glazed courts—actually the exposed
gaps in the “V” shape—are the only way natural light is allowed into the building.
All other surfaces are clad in stone. Since the glass walls are all recessed, they are
effectively Sheltered from the intense heat and glare of the sun. A continuous
vertical gap is also provided where the apex of the two triangles overlaps, allowing
the hot air to circulate right up through the center of the building. The combined cooling effect of the recessed glazing and the vertical air movement results in a temperature difference of 10 degrees between the air on the outside surface of the glass walls and that outside the building altogether. The arrangement is therefore highly effective in reducing the energy costs of running an otherwise mechanically air-conditioned building. The elevate courts recessed into otherwise blank walls also echo elements of the traditional architecture of the region. Yet they do so not by any direct imitation of regional forms, but by strict adherence to similar principles of climate control.

The design is not without its drawbacks, however. The fact that all the office floors have windows only on one side necessitates an open-plan concept, to maximize the benefits of the natural light and the splendid views. This does not suit Saudi Arabian tastes too well, since Saudis prefer a cellular office plan if they can have it, as in the Ministry of Foreign Affairs.

The blank walls with their three great recesses also create ambivalent affects of scale. Close up, where the glazed fenestration and other details such as the trees planted in the courts can be appreciated, there is no problem. But from a distance, the simplicity of the form and the lack of visible detail make the building appear scaleless, even though it dominates the rest of the city. As an architectural response to the harsh climate of the region, Bunshaft’s tower can hardly be faulted. But as a new and prominent element in the city, it makes an odd landmark.

What can we conclude from such a wide range of architecture? Perhaps the most obvious but still essential point to make is the importance that most architects have attached to the influence of climate in their designs. Whatever cultural changes may have occurred in the region, the architects’ varied responses to the unforgiving climate have their own rationality and play a considerable part in shaping the regional character of their architecture.

With regard to El-Wakil’s traditional approach, I remain hopeful that this talented architect can yet make the creative leap necessary to apply his approach convincingly to a wider range of contemporary building types. It should be remembered that the building types and forms traditional to Islamic societies often fulfilled many different functions, resulting in fluid relations between form and function. Such an adaptable architecture could surely be turned to advantage in
today's fast-changing world. After all, flexibility is one of the prime requirements of contemporary building types of all sorts. If the Muslim architects of the past could use their architecture to produce multipurpose and flexible buildings, why cannot the architects of today do likewise?

My point regarding the adaptability of traditional forms of architecture in Islamic societies can be broadened. The sorts of cultural exchanges I talked of earlier could not have occurred if the relations between building form and function were as fixed as we were led to believe by the founders of the modern movement. I would not go so far as some post-modernists are doing in claiming a complete cultural autonomy for architecture. That seems to me to encourage architects down a slippery path toward self-indulgence and detachment from the needs of society. I prefer to regard the relations between architecture and other distinct cultural forms in the more demanding terms of a changing dialogue, involving at its best a creative reuse and adaptation of architectural forms and ideas for different purposes at different times and places.

The specific models and metaphors referred to in the buildings we have been looking at trace just such a creative process of cultural exchange across time and place. What is noticeable in the most successful designs is the very broad range of references, covering distant sources in the Islamic, as well as the Western world. I believe they confirm what my spectrum was intended to demonstrate: that the issue which confronts us here is not any kind of hard-and-fast choice between either a tradition-oriented approach or a modern approach, but a whole variety of choices lying anywhere in between and including the two extremes.

What also becomes transparently clear from all these projects is the necessity of gaining complete familiarity with the full range of possible sources. Remember: nothing comes from nothing! How is it possible to expect contemporary architects to make the sorts of creative connections between present and past that I have illustrated here, if they are unaware of, or have insufficient respect for, their own heritage? So there is a vital task of education to be performed, as I have found from my own experiences teaching in the Islamic world, both in Malaysia and in Saudi Arabia. It may be noted that all the architects I have been talking about, both Muslim and non-Muslim, are self-educated in the traditions and historical exemplars of architecture in the Islamic world. Perhaps that is understandable among Western architects, but it is shocking that an architect like El-Wakil should have had to teach himself respect for his own culture.

Lastly, all the building projects shown in my group have been affected one way or the other by the changes in settlement patterns that go with the sorts of modern development plans adopted by Saudi Arabian leaders in the last few decades. To a large extent, what an architect can do is largely circumscribed by these plans, since the building types he has to deal with are already selected according to the patterns of settlement encouraged within a given plan. That does not mean that what he does is not important—the buildings I have shown prove otherwise. But if architects want to have a say in the original choice of building type, then they will have to get more involved with the choice of the development plan itself. That, however, is a matter which concerns not just architects, but citizens of any developing country. It also lies outside the scope of this meeting.
Notes


We hope that this seminar has been as stimulating for you as it has for us. In it we have together faced a difficult challenge in tackling a much neglected subject and have taken stock of where we stand on it today.

I would like to go back for a moment to our original intention in holding this meeting. By bringing in the historians and talking about precedent we had intended to deal with how precedent fits in with the many theories and principles that bear on design in Islamic societies. The idea of using the past in different ways is in the air. Editors of magazines and committees of the Aga Khan Awards are constantly receiving statements from architects that their current work is based on "Islamic precedent," but with no clear idea of what that might mean. We thought the time had come to examine what these claims were all about in a symposium that was designed to bring together all possible points of view and to embrace all approaches to design.

We feel that on the whole the attempt was justified by the event. We were all pleased to see some stimulating examples of new architecture and urban design in the Islamic world and to glimpse some of the thought processes that produced them. Whether a coherent picture has emerged from the symposium is another matter. But perhaps it is not one coherent picture that we are looking for. A coherent picture suggests a coherent theory behind it, and in the vast heterogeneous world of Islam that is both unlikely and arguably not even desirable.

Great diversity is inevitable. It will enrich and continually interact, aided by regional differences and developing in each place along different lines. But what has become equally clear is that a consensus about underlying rationales even in individual work is still lacking. Until that stage has been reached, an essential ingredient in architectural development—communication between thinkers and creative designers—will not exist, education will remain difficult, and the identification of the goals of research leading to new understanding and new designs will continue to elude us. Designers are concerned about responding to character and place, but many questions about the way it is done and the ways possible approaches are tested need thrashing out if architecture is once more to take a proud role in the Islamic world.

I was struck by the two levels of communication about architecture in Islam that could be discerned here, one practical and the other poetic. One speaker told us that hadghin, the word for the functional cooling tower, was a metaphor for love blowing hot and cold; another that poetic imagery was always attached afterward and was never a part of the creative process. But perhaps the poetic dimension was an essential ingredient of Islamic architecture, as it is of Islamic life, and was present at its very conception.

When we planned the symposium we hoped that by putting together so many points of view we could create a highly charged debate that would generate new
ideas. On the whole that did happen. The scope of the symposium was deliberately broad. That had the great advantage of making it potentially all-embracing, but the disadvantage of dispersion. I shared the reaction of some of the contributors that at times the participants appeared to be speaking from quite different agendas, and that one part of the audience was finding incomprehensible what another part was discussing with perfect understanding. Part of that problem lay in the apparent unwillingness of many of the speakers to trade ideas with other speakers to the point where at times the proceedings resembled the spectacle of shadow boxers moving around an empty ring. One architectural historian commented to me that "the architects just seemed to be talking to themselves." For example, did the deliberations of the architectural historians on the first day enrich the subsequent debate of the architects? Were they ever even referred to?

Similar difficulties cropped up among segments of the architectural audience as well. A number of the disagreements that arose in the question periods were clearly based on serious failures of communication. But fortunately others were as firmly the outcome of healthy debate which we need to continue if we are ever to develop architectural thought at a serious level.

The study of the historical roots of the built environment is not only important to architects and urban designers, but involves others who study civilizations—economists, politicians, and social scientists, with whom we share the "weight of the past upon the present." It has been said that history is the means by which a society accounts for its past, but it is also a yardstick by which we assess present qualitative achievements and extrapolate to achieve future goals.

A large number of points raised in the symposium remained unresolved. I trust that the audience carried them away to ponder further. One of these was the thorny question of pastiche. When an architect copies a minaret or a portal, what is he doing? Is he using the approach of the craftsmen—or of a modern artist like Picasso—who copy in order to learn and to come to terms, as it were, with the works of the past? Or is he paying tribute to a masterpiece by performing it again, rather like a musician? Or is he making a literal reference? Or is he involving himself in some way that is entirely different from any of these? Only the architect can answer for his own motives. That is one reason why it is particularly to be regretted that Abdelwahed El-Wakil could not attend the symposium. It would have been challenging, and I am sure hugely entertaining, to have engaged him in that debate. But many other people are also doing the same things, and the reasons why they are seem to be important questions worth debating.

A related topic is the study of precedent to create a kind of deterministic value system in the environment. This is surely controversial. But although it was implied in some of the discussion, it was seldom explicitly referred to.

I regret that there was not more time to discuss the many brilliant papers and contributions. I would like also to say that spontaneous happenings are the life of a conference and a manifestation of vital debate, and for that reason the organizers were particularly happy to learn of an extra lecture held outside regular hours. It is always difficult to satisfy the demands of everyone, and that seemed to be an eminently satisfactory way of dealing with the problem.

Some possible conclusions have emerged. Responding to the existing physical and cultural context seemed to be an agreed-upon prerequisite for good design, unless there is a clear and essential reason for not doing so. The purpose of this response, it was suggested, is generally the same: the strengthening of social, communal, and ritual values by reinforcing the systems and orders already in place. To that I would add the avoidance of innovation for its own sake, especially if it abuses the manners of the place. For an architect to risk destroying the
coherent elements of a society which is already under threat from external forces, whether the design interference is social, physical, or visual, is surely to place oneself in the position of becoming an accessory to disintegration and ultimate disaster.

As we left the conference, I hope we took with us some sense of common purpose, of the sincerity and humility with which the search for a better environment in the Islamic world is being carried on, and perhaps even more important the conviction that developing theories about architecture and design is an essential part of that task.

Where do we go from here? Perhaps by developing programs of systematic studies which we could carry on, whether alone or with others, by which any superior building or environment, contemporary or old, could be evaluated and recorded. Our work suffers from a lack of hard data. Only by the gathering and publishing of critical and analytical studies will new theories and new directions emerge. It is a task which I hope you will agree is essential.

I trust that the Aga Khan Program will be emboldened to convene another symposium in the not too distant future, perhaps this time with a more precisely focused theme. I hope it will prove to be as stimulating, provocative, enjoyable, and perhaps as much of a landmark, as this one has been.
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Raseem Badran, practiced architecture in Germany after his graduation from Darmstadt University in 1970. He returned to Jordan in 1973 as a partner in the firm Shubeilat Badran Associates. In 1983 the firm won the first prize in the Baghdad State Mosque competition.

Keith Critchlow is the director of the Visual Islamic Arts Unit, Royal College of Art, London and a fellow of the Royal College of Art. He has also designed buildings and other projects in Islamic countries. He is the author of *Islamic Patterns: A Cosmological Approach*.

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S. Gulzar Haider is professor of architecture at Carleton University, Ottawa, and a member of the Organization of the Islamic Conference and the International Commission for the Preservation of the Islamic Cultural Heritage. He designed Islamic Centers near Indianapolis and for the State University of Arkansas and co-designed a housing system now being marketed in Central and South America.
Klaus Herdeg is professor of architecture at Columbia University, with a special interest in non-Western architecture. His book the *Decorated Diagram* (1983) examined design principles through an analysis of Gropius’s teaching at Harvard and the work of his students. Two books, *Formal Structure in Indian Architecture* and *Formal Structure in Islamic Architecture of Iran and Turkistan*, were associated with exhibitions organized by Professor Herdeg. The second was on display at the symposium.

Renata Holod is associate professor and chairman of the History of Art Department at the University of Pennsylvania, and formerly Convenor of the Aga Khan Award in Architecture.

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Kamil Khan Mumtaz taught at the faculty of architecture, Kumasi, Ghana, from 1964 to 1966 and was head of the architecture department at the National College of Arts in India from 1966 to 1977, where he established the course of study still in use there. In private practice he led the team of consultants assigned to the Lahore Urban Development and Traffic Study which included proposals for upgrading and conserving the Walled City. He has written several papers on architectural issues in the region, and a book, *Architecture in Pakistan*.

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