The Tectonics of Byzantine Architecture

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ABSTRACT

This study is part of an ampler research which seeks to answer the question of how to build Orthodox Christian churches today by investigating the architectural tradition of the past, and more specifically the material means through which identity and symbolism are infused into Byzantine church architecture. One of the facets of this research is to use tectonics—the poetics of construction as defined by Kenneth Frampton—to investigate the material aspects of Byzantine architecture. Frampton makes an important distinction between the ontological (core form for Bötticher, technical for Semper) and representational (artistic form for Bötticher, symbolic for Semper) elements of construction. Representational elements may be non-architectural symbols (the altar, iconostasis, or iconographic murals/mosaics in Byzantine architecture) or symbols of hidden structural elements (the undulating roofing revealing the shape of vaults, the blind façade arches representing the structural arches, the decorative façade masonry as a visually appealing facing of the structural masonry behind it). Another important aspect is the play between the tectonic and atectonic architectural expression. Richard Ousterhout makes a case for the former when he demonstrates the structural clarity of Byzantine architecture; he also shows examples of the "manneristic subversion" of structural clarity in late Byzantine churches, but argues they are the exception to the rule. Other aspects of Frampton's theoretical framing of tectonics relevant to the study of Byzantine architecture are the multisensorial experience of architecture, the spiritual and cosmologic symbolism of the act of building, and the phenomenological approach to technology.

INTRODUCTION AND PRELIMINARY CONSIDERATIONS

1.1 The Purpose and Context of this Research

This study is a part of an ampler research which investigates how materials and technologies convey the meaning of Orthodox Christian ecclesiastical architecture, and which has produced the thesis "Rich Materiality: A Hermeneutic Approach to Byzantine Architecture"[1] and the doctoral dissertation "Matter and Meaning in the Architecture of Eastern Churches".[2] The purpose of this research is to answer a difficult question: how to build new Orthodox churches today.

After the fall of the communist regime in 1989, the newly re-conquered religious freedom found Romania in acute need of places of worship. The clients (clergymen, lay communities, monastic communities) requested"traditional" churches, usually without defining the traditional character beyond enumerating specific morphological elements. Most new churches answer these requirements superficially, proving the difficulty of the subject and the unpreparedness of architects. Innovative designs valued by the professional community were not welcome by the Orthodox community.

This situation prompted a response in the field of architectural theory from architects such as Augustin Ioan, Florin Biciuşcă, or Mihaela Palade, manifested through numerous articles, books, and public debates. This research has produced interesting results, but which have no visible influence on the quality of new church architecture.

A great difficulty is the discrepancy between the traditional forms, which cannot be abandoned because of their symbolic meaning, and contemporary materials and technologies. Many architects think, following the Modernist assumption that specific forms are generated by the use of specific materials and technologies, that this discrepancy is irresolvable. However, historic examples show that the worldview of a community

[1] Botez, Ana: Rich Materiality: A Hermeneutic Approach to Byzantine Architecture. Master of Science in Architecture thesis. University of Cincinnati, 2011. Published online at http://etd.ohiolink.edu/view.cgi?acc_num=ucin1313768425

[2] Botez, Ana: Materie şi semnificaţie în arhitectura bisericilor răsăritene. Doctoral dissertation. University of Architecture and Urbanism "Ion Mincu", Bucharest, 2012.

often has a stronger influence on architectural design than the available materials and technologies. Communities choose and adapt available materials and technologies or even invent new ones appropriate for their design intentions. Therefore, new church design should adapt available materials and technologies to traditional forms. Still, the difficulty remains.

The relation between form and symbolic meaning in church architecture being firmly established, what remains to be clarified is how the constructive means participate in this relation. This paper proposes an interpretation of the role played materials and technologies in conveying the rich symbolism of an Orthodox Christian church based on tectonics as defined by Kenneth Frampton.

1.2 Why Byzantine Architecture Is Relevant for the Purpose of this Research

This research is based on the presupposition that the Orthodox Christian worldview or, as we may call it, the Orthodox Tradition, does not vary in time and space. This unitary worldview generated a unitary architectural and artistic tradition: the Early Christian architecture from the entire Roman Empire, the Byzantine architecture specific to the Eastern Roman Empire, and the Post-Byzantine architecture from Romania and other Orthodox Christian countries create a continuum characterized by unity in diversity. This means we may use the Orthodox Tradition, as expressed in texts from various epochs, to interpret the church architecture from the past and apply the findings to Orthodox Christian churches from the present. This is the Orthodox Christian standpoint which, given the purpose of this research, I have considered as an appropriate assumption.

Byzantine culture was the most consistent and enduring cultural expression of the Orthodox Tradition. Byzantine architecture is more closely adjusted to convey its Christian symbolism than Early Christian architecture, which mostly selects and adapts from the pre-existing Roman typologies. Also, the financial and artistic resources of imperial magnitude available in the Byzantine epoch allowed the use of materials (such as mosaics and a variety of marbles), technologies and architectural configurations (such as the majestic domed basilicas) that became unavailable or impossible to realize in later, more modest times.

Interpreting Byzantine architecture from the standpoint of Orthodox Tradition is also important because for centuries, Byzantine art and architecture has been misunderstood, misinterpreted and understated by Western scholars. Moreover, many modern historians and scholars have looked at Byzantine culture as if it were extinct. They see aspects of it as enigmatic and impossible to understand without speculation, in the absence of evidence coming from precisely the same epoch as the one investigated. This assumption, although required by scientific rigor, may miss important insights because it delimits itself from the Orthodox Christian assumption that the same tradition which created Byzantine architecture and art has survived the fall of Constantinople and other great historical changes in the Orthodox Church.

It is difficult, if not impossible, to prove this cultural survival scientifically, beyond any doubt. And yet, Byzantine and Post-Byzantine churches in many countries are still in use. Constantinople has remained the seat of the Ecumenical Patriarch of the Orthodox Church for more than 1500 years, which allowed for continuity. The Holy Mount Athos, a millenary "monastic republic", has maintained a spiritual and cultural communion between many generations of Orthodox Christians from many countries. In spite of the national and local flavor acquired by the Post-Byzantine tradition, these local traditions manifest an unbreakable unity in diversity. Not even the westernizing experiments attempted in Russia since Peter the Great (1682-1725) and in Romania or Greece since the 19th century could break the line of the Byzantine tradition; through the efforts of dedicated artists and scholars, truly traditional art has been revived.

For the purpose of this research, I will emphasize the continuity of Tradition in the Orthodox Church and the unity in diversity of its artistic and architectural expressions along the centuries. This will allow an interpretation of historical church architecture, even if written evidence from the same epoch is incomplete.

1.3 Kenneth Frampton's "Poetics of Construction"

Part of my research focused on contemporary critiques of Modernism and theoretical approaches to the material aspects of architecture. A very important approach is Kenneth Frampton's book *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*[3].

In this book, Frampton presents several architects and their works in an alternative history of architecture seen as the art of construction. The aesthetic principles he discerns are appropriately called tectonic (to which I added an "s" in order to give the noun a plural form, distinguishable from the adjective) or the "poetics of construction". As a theoretical foundation, Frampton proposes the essay "Introduction: Reflections on the Scope of the Tectonic",[4] which seeks an alternative to the definition of architecture as the art of space. For Frampton, the "unavoidably earthbound nature of building is as tectonic and tactile as it is scenographic and visual".[5] The concreteness of architecture makes it necessarily a construction first and only then a geometric abstraction.

The subchapter "Etymology"[6] presents the etymology and use of the term „tectonic" in the history and theory of art and architecture. Karl Bötticher used it for denoting the unified system that joined together the parts of a Greek temple, both structural and sculptural, and distinguished between the *Kernform* (core form) and the *Kunstform* (art form) of a temple, where for example the wooden rafters are the *Kernform* and their representation as triglyphs is the *Kunstform*.[7] Gottfried Semper proposed a tectonic definition of architecture inspired by a "primitive hut" from the Caribbean, based on four elements:[8]

- The earthwork: load-bearing, solid; in the hut, a platform of compacted earth; it is related to substructure works and heavy, load-bearing walls.
- The hearth: non-load-bearing, functional and symbolic.
- The framework and roof: load-bearing, made from posts and beams.
- The enclosing membrane: non-load-bearing, lightweight; in the hut, woven from vegetal materials; related to wattle-and-daub infill walls and brickwork infill panels in half-timbered structures.

The distinction made by Bötticher for the architecture of Ancient Greeks is also relevant for the Byzantine architecture built by Medieval Greeks, as it will be shown below. On the contrary, Semper's classification is not that easily matched to the type of structure employed for Byzantine churches.

In the subchapter "Topography",[9] Frampton investigates the character and identity of place and how this may be built or modified. The gesture of marking a place with a stone, evoked by Vittorio Gregotti as a precursor of architecture, is present in the ritual of church consecration as the gesture of marking with a stone the place where the church will be built. Also, as an architectural and social-communal gesture, a church can build a place in an architectural and phenomenological sense or to "heal" a de-structured place.

The subchapter "Corporeal Metaphor"[10] reviews the theoretical references concerning the multisensorial perception of architecture, especially through the senses connected to the position and movement of the body, but also through smell or hearing. In Byzantine church architecture, the multisensorial perception of the space is experienced most profoundly during the liturgy, when all the senses are involved.

The subchapter "Ethnography"[11] presents the cosmological and spiritual meaning of traditional architecture. In any architectural tradition, buildings reflect the worldview of their designers and constructors, and are

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[3] Frampton, Kenneth: Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture. Cambridge, Massachusetts, 1995.
[4] Studies in Tectonic Culture, pp. 1-27.
[5] Studies in Tectonic Culture, p. 2.
[6] Studies in Tectonic Culture, pp. 3-8.
[7] Bötticher, Karl: Die Tektonik der Hellenen. (2 vols.) Potsdam, 1852. Cited in Studies in Tectonic Culture, p. 4.
[8] Semper, Gottfried: The Four Elements of Architecture. In: Mallgrave, Harry and Hermann, Wolfgang: The Four Elements of Architecture and other writings by Gottfried Semper. Cambridge, England, 1989. Cited in Studies in Tectonic Culture, pp. 4-5.
[9] Studies in Tectonic Culture, pp. 8-9.
[10] Studies in Tectonic Culture, pp. 10-12.
[11] Studies in Tectonic Culture, pp. 12-16.

images of the cosmos. The act of building is a ritualized actualization of the creation of the world. This is also true for churches, as it will be shown below.

In the subchapter "Representational versus Ontological",[12] Frampton introduces the distinction between ontological elements *(Kernform* or core form for Bötticher; technical elements for Semper—the earthwork and the framework) and representational *(Kunstform* or art form for Bötticher; symbolic elements for Semper—the hearth and the enclosing membrane). Leaving aside purely symbolic, non-constructive elements, representational elements may be an expression of the ontological elements (which is how Bötticher defined the art form) or may carry other meanings. This distinction is highly relevant for the architecture of Byzantine churches.

The subchapter "Tectonic/Atectonic"[13] reviews these opposed concepts. According to Eduard Sekler, the tectonic is the expressivity resulting from using forms adapted to load-bearing requirements beyond the purely structural and constructive.[14] Sekler also defined the atectonic as "a manner in which the expressive interaction of load and support in architecture is visually neglected or obscured."[15] These concepts may be used as well to describe Byzantine architecture.

In the subchapter "Technology",[16] Frampton refers to Martin Heidegger's investigation of the interaction between technology and modern society. These are: the relationship between space and place;[17] the return to the Greek origin of philosophical terms, erasing the errors of forced translations into Latin;[18] the expressive use of material in art works as opposed to utensils;[19] the work of art as the expression of truth.[20] Heidegger does not oppose technology in general, but only its negative aspects; his criticism has the purpose of making us aware of the problems in order to solve them.

Aspects of Heidegger's thinking may help in understanding traditional architecture, including Byzantine church architecture. Especially interesting is the relation between *earth* (the one which supports us and our architecture, feeds us, and is the source of all raw materials), *world* (made by man both in the physical sense of the built environment and in the conceptual sense of cosmos as experienced, perceived and understood by man), and the art work, with all its aspects: „setting forth" the earth by using materials artistically; "setting up" the world by expressing through architecture the worldview of the community; expressing truth through the work of architecture. Looking at Byzantine architecture with the theoretical tools provided by Heidegger would be a fascinating research topic, but goes beyond the limits of this paper.

The final subchapter "Tradition and Innovation"[21] focuses on the imbalance between tradition and innovation brought forward by the Modern Movement. Unlike the (other) fine arts, where creation and innovation meet no constraints, architectural creation has to relate to built heritage as the environment for the social and cultural life of a community and as an expression of tradition. Frampton closes his study with a meditation on architecture as a field for the meeting between nature and culture, between space and time. Architecture transforms and builds places, is subject to aging and weathering, and at the same time creates a setting necessary for man, society, and culture. This is why architecture should be designed and built not for a passing moment in time, but in order to last.

In church architecture, belonging to tradition is more important than belonging to the passing characteristics of an epoch, also known as the Zeitgeist. New churches design should be oriented towards actualizing

[12] Studies in Tectonic Culture, pp. 16-19.
[13] Studies in Tectonic Culture, pp. 19-21.
[14] Sekler, Eduard: Structure, Construction, and Tectonics. In: Connection: Visual Arts at Harvard, March 1965, pp. 3-11. Cited in Studies in Tectonic Culture, pp. 19-20.
[15] Sekler, Eduard: The Stoclet House by Josef Hoffmann. In: Essays in the History of Architecture Presented to Rudolf Wittkower. London, 1967, pp. 230-231. Cited in Studies in Tectonic Culture, pp. 20-21.
[16] Studies in Tectonic Culture, pp. 21-24.
[17] Heidegger, Martin: Building, Dwelling, Thinking. In: Heidegger, Martin. Poetry, Language, Thought. New York, 1971, pp. 154-155. Cited in Studies in Tectonic Culture, p. 22.
[18] Heidegger, Martin: The Origin of the Work of Art. In: Heidegger, Martin. Poetry, Language, Thought. New York, 1971, pp. 26. Cited in Studies in Tectonic Culture, p. 23.
[19] The Origin of the Work of Art, p. 46. Cited in Studies in Tectonic Culture, p. 23.
[20] The Origin of the Work of Art, p. 41. Cited in Studies in Tectonic Culture, p. 23.
[21] Studies in Tectonic Culture, pp. 24-27.

tradition today, using the available materials and technologies, be they old or new, and not towards adjusting tradition forcibly to fit the Zeitgeist.

THE TECTONICS OF BYZANTINE ARCHITECTURE

The following is a tentative sketch for a tectonics of Byzantine church architecture. The phenomenon is far too complex and diverse to be exhausted in so few pages; it deserves a wider space and a more systematic illustration with examples from various epochs and regions.

1.4 Building with Spiritual Meaning: The Symbolism of Byzantine Church Architecture

This subchapter reviews briefly the complex symbolism of the church, as seen from the standpoint of the Orthodox Christian Tradition, insisting on those aspects that influence architecture. The subject is treated more extensively in the dedicated chapter of my dissertation.[22]

The meaning of the church as a place of worship is strongly connected to the meaning of the Church as a community, which in the New Testament is described as a mystical temple.[23] This may be why most Byzantine façade treatments emphasize the bricks and stones of the walls. There is also a cosmic symbolism of the church, as explained by Sts. Maximus Confessor[24] and Symeon, Archbishop of Thessalonica.[25] This is revealed especially by the geometry of the church, based on circles (heaven) and squares (earth). Also important is the mystical symbolism which draws believers to the spiritual realm and helps them in their spiritual ascent towards communion with Christ in the Church. This aspect is treated by Sts. Dionysius Areopagite[26] and Symeon of Thessalonica,[27] as well as by Fr. Dumitru Stăniloae.[28]

1.5 Building for the Body: The Multisensorial Experience of Byzantine Church Architecture

In Byzantine church architecture, the multisensory perception of the built environment is best experienced during the liturgy, when all senses are involved. The multisensory experience of the Holy Mysteries of the Church (Baptism, Chrismation, Eucharist) is mentioned by St. Symeon of Thessalonica as purifying not only the senses, but also the soul of those who participate.[29] The sight is filled with the beauty of the holy icons and of the liturgical choreography, the hearing opens up to sacred music and chanting, as well as edifying words, the sense of smell receives the fragrance of incense and the gentle scent of beeswax from the burning candles, the sense of balance and posture maintains the body in prescribed positions (standing or kneeling) or moves it in ritual gestures (making the sign of the cross, bows, or prostrations). Hands rarely touch anything, but lips kiss the hand of the priest or the icons presented for veneration. The mouth tastes the bread and the wine of the Holy Communion. The water of Baptism washes the whole body, and the Myhrr of Chrismation anoints it.

Between services, the scent of incense and beeswax may linger, and the highly reverberating space is strikingly quiet, contrasting pleasantly with the noise of city life. In the summer, the shade and coolness of Byzantine interiors provide relief from the sun and the heat. Sadly, the contemplative quietness and the discreet but persistent ritual scent, not to mention the sensory richness of the liturgy, are lacking in those churches that have been turned into museums, making the experience of their architecture a truncated one.

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[22] Semnificaţia bisericii. In: Materie şi semnificaţie în arhitectura bisericilor răsăritene, pp. 46-68.
[23] 1 Peter 2:4-6; Ephesians 2:19-22; 2 Corinthians 6:16.
[24] Maxim Mărturisitorul, Sf.: Mystagogia. Cosmosul şi sufletul, chipuri ale bisericii. Bucharest, 2000.
[25] Simeon Arhiepiscopul Tesalonicului, Sf.: Tratat asupra tuturor dogmelor credinţei noastre ortodoxe, după principii puse de Domnul nostru Iisus Hristos şi urmaşii Săi. Vol. 1. Suceava, 2002, pp. 157-186.
[26] Dionisie Areopagitul, Sf.: Despre Ierarhia Cerească. In: Dionisie Areopagitul, Sf. Opere Complete. Bucharest, 1996, pp. 15-70.
Dionisie Areopagitul, Sf.: Despre Ierarhia Bisericească. In: Dionisie Areopagitul, Sf. Opere Complete. Bucharest, 1996, pp. 71-134.
[27] Tratat…, pp. 131-186.
[28] Stăniloae, Dumitru: Locaşul bisericesc propriu-zis, cerul pe pământ sau centrul liturgic al creaţiei. In: Mystagogia..., pp. 49-92; originally in: Mitropolia Banatului, No. 4-6/1981, pp. 277-307.
Stăniloae, Dumitru: Biserica, în sensul de locaş şi de largă comuniune în Hristos. In: Mystagogia..., pp. 93-110; originally in: Ortodoxia, No. 3/1982, pp. 336-346.
[29] Tratat…, p. 178.

1.6 Representational and Ontological Elements in Byzantine Church Architecture

The distinction made by Bötticher for the architecture of Ancient Greeks is also relevant for the Byzantine architecture built by Medieval Greeks. For example, especially in the Middle and Late Byzantine churches, the exterior features highly decorative brick-and-stone patterns, sometimes incorporating other elements such as ceramic ornaments, which create a visually attractive representation of the load-bearing masonry inside the wall. They are neither entirely ornamental, because integrated in load-bearing walls, nor entirely structural, because simpler, more regular bonding patterns would be better suited to bear loads; this is why Bötticher's *Kunstform* concept describes well their tectonic quality. Other examples include the correspondence (entirely unnecessary from a structural standpoint) between façade decorative arches and structural arches and vaults encased into the interior side of the wall or the curved roofs made of lead sheets or of corrugated ceramic tiles which follow closely and therefore reveal, instead of hiding, the curves of the vaulting beneath.

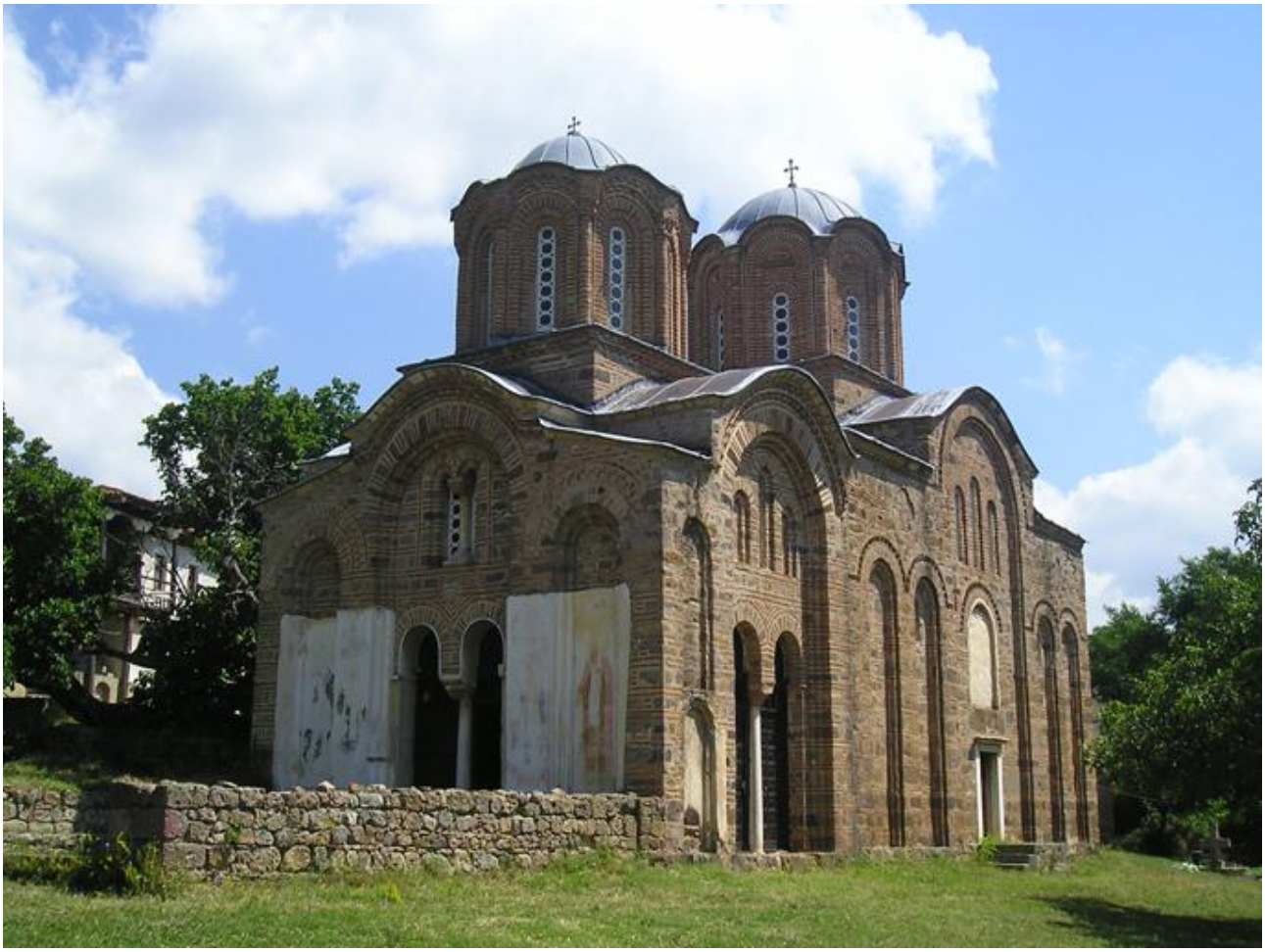

Fig. 1: The decorative masonry and roofing as the art form which represents the core form (load-bearing structure). Church of Lesnovo Monastery, Macedonia (former Yugoslavian republic), 14th century.

Semper's scheme works well for many architectural traditions, but not for all. Load-bearing masonry walls are related to the earthwork in their solidity and structural purpose, and yet related to the woven membrane because made from the "weaving" of bricks or stones.

In the Byzantine church architecture, the hearth is replaced by the altar as the purely symbolic / representational element, with the richest religious and spiritual symbolism. Usually, there is no framework or roof structure, unless we take into consideration the reinforcing beams hidden inside the walls, typically at the level of springing points, so that they can work together with the tie beams. The earthwork is represented by the underground substructure, but also by the massive load-bearing masonry walls; the vaulting, although relatively lightweight, is still a massive load-bearing element and not a lightweight screen-like element.

The most screen-like element is the iconostasis or icon stand, a non-load-bearing, non-constructive, but highly symbolic screen of icons that separates the sanctuary from the nave, its purpose being to make visible

the invisible spiritual reality at work behind it. As noted above, the exterior surface of the walls is also a cladding-like element, with the role of making visible the structure of the church (the exterior walls and the arches and vaults resting on these walls), in a manner quite similar to Hendrik Berlage's decorative wall surfaces for the Amsterdam Stock Exchange (1898-1903),[30] albeit less rigidly inclined towards extreme flatness. There is also another layer of meaning to be detected in the New Testament imagery of the Church as a mystical edifice and of the faithful as spiritual stones. The roofing is also a cladding-like element, typically following closely the curved vaults, concealing them and at the same time representing their configuration.

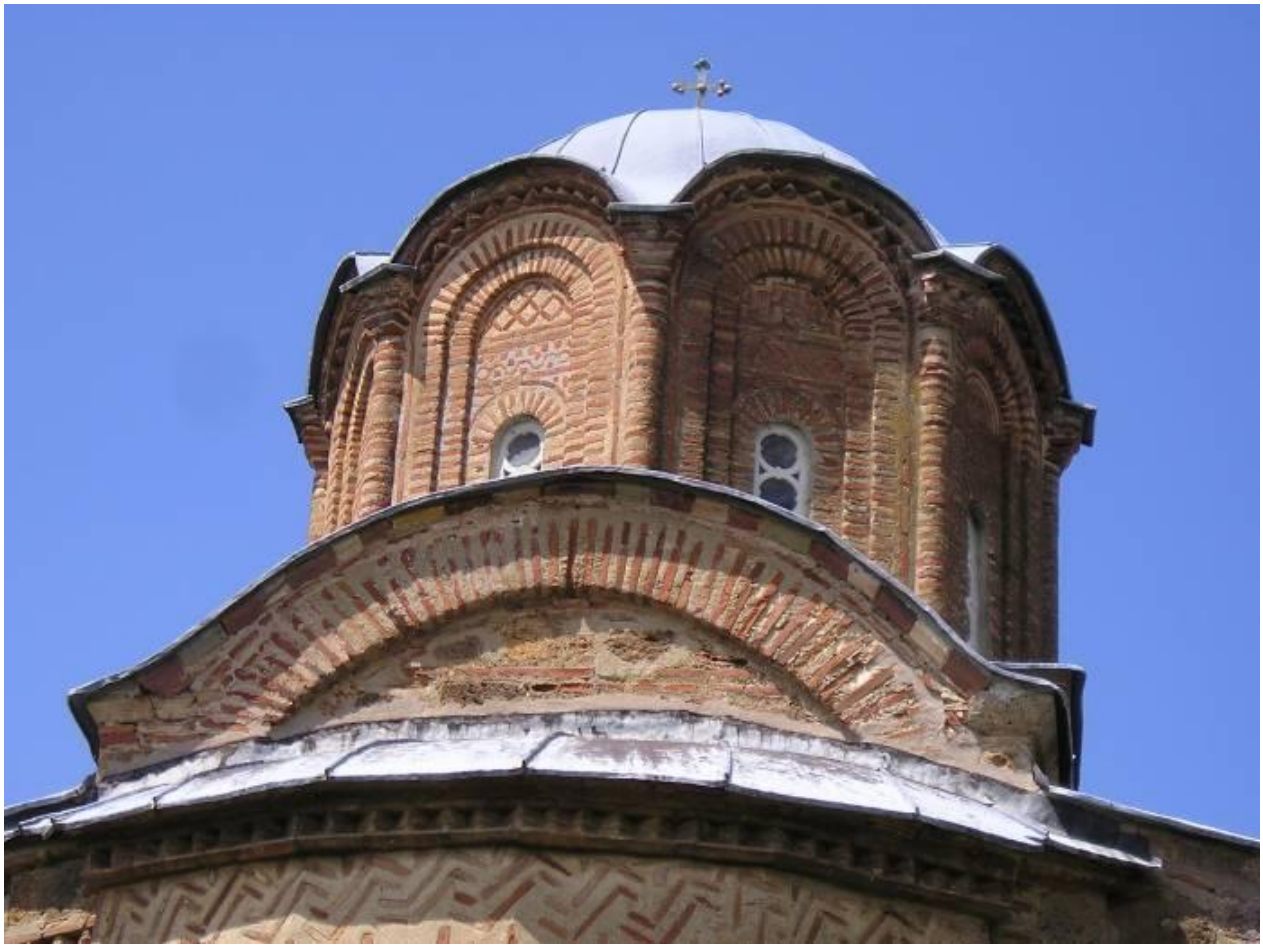

Fig. 2: The exterior surface of the wall and the roofing as cladding-like elements which reveal the constructive logic of the structure. Church of Lesnovo Monastery, Macedonia (former Yugoslavian republic), 14th century.

Inside, the veil-like layer of frescoed plaster or the tapestry-like mosaics used in conjunction with polychrome marble revetments belong also to the category of claddings, but of the sort which conceal the structure, from which they are almost entirely but not completely disconnected, and bring higher symbolic meaning and artistic value to the church interior. Unlike Adolf Loos' marble claddings,[31] the Byzantine ones have a strong symbolic logic; their archetype is the Jerusalem Temple, clad by Solomon in stones of many colors.[32] Moreover, they prophesize silently the descent on earth of the Heavenly Jerusalem, described in the Book of Revelation as being built over twelve foundation stones made from vividly colored gems.[33] As for the iconographic frescoes or mosaics, although they conceal the actual masonry of the vaulting and walls, their composition is not indifferent to and cannot conceal the configuration of the structure, from which the structural design and the structural response to loads may be inferred.

[30] Studies in Tectonic Culture, p. 18.
[31] Studies in Tectonic Culture, pp. 18-19.
[32] 1 Chronicles 29:2; 2 Chronicles 3:6.
[33] Revelation 21:18-21.

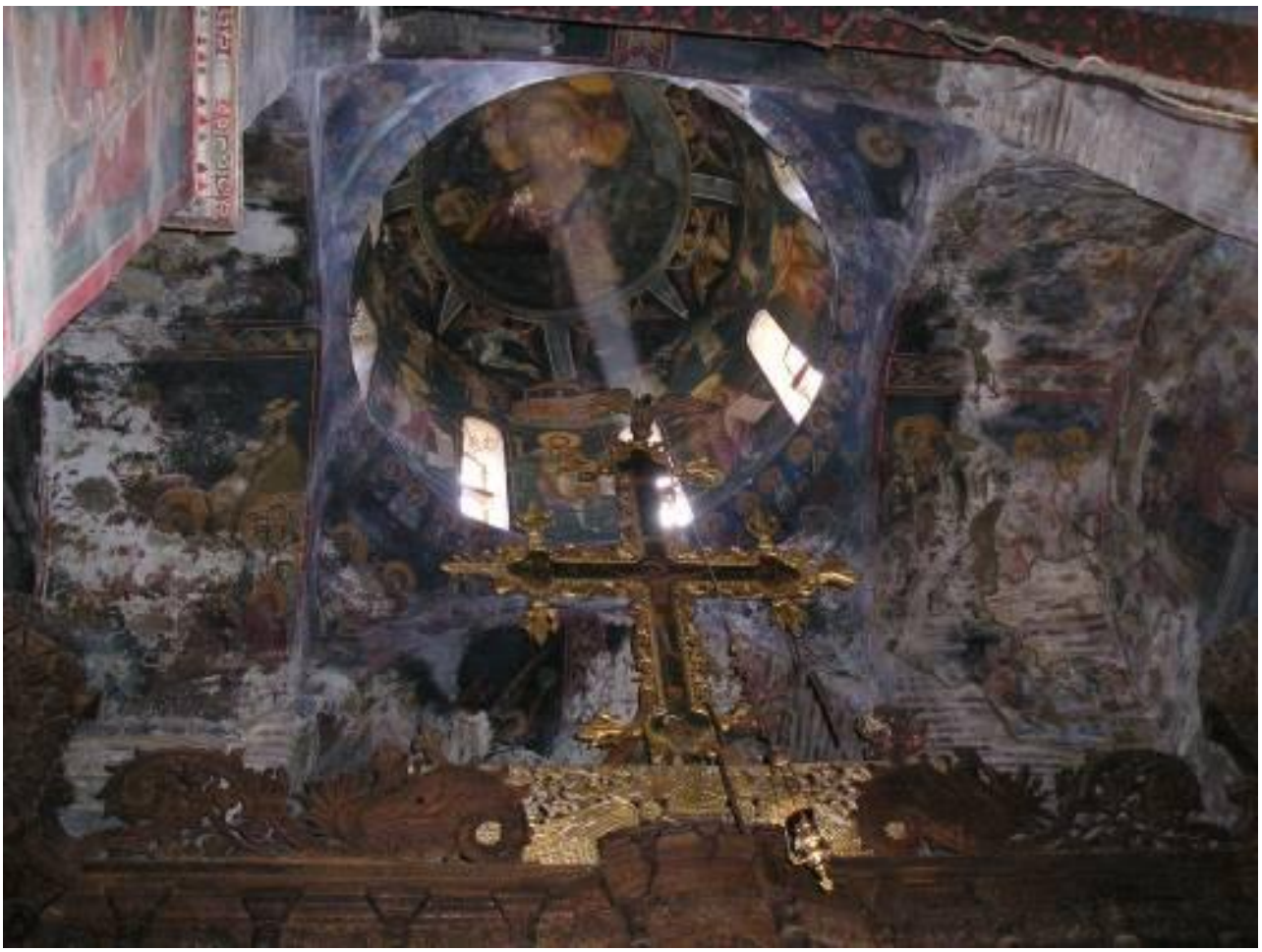

Fig. 3: The interior veil of frescoes as a cladding-like element which conveys a symbolic meaning and which reveal in a discreet manner the constructive logic of the structure. Church of Lesnovo Monastery, Macedonia (former Yugoslavian republic), 14th century.

As noted above, Frampton categorizes construction elements into ontological (*Kernform* or core form for Bötticher; technical elements for Semper—the earthwork and framework) and representational (*Kunstform* or art form for Bötticher; symbolic elements for Semper—the hearth and the cladding or enclosing membrane). Representational elements can be of two kinds: representations of ontological elements (these being structural elements found behind them) or carriers of aesthetic or symbolic meaning unrelated to the ontological elements. Applying these categories to Byzantine architecture, we find as representational elements of the first kind the decorative façade masonry and the roofing, and as representational elements of the second kind the iconostasis, the frescoes or mosaics, and the marble claddings. This classification can explain how church builders conceived their work better than the stereotype expression of "honest use of materials", which cannot explain why they could switch, when necessary, from decorative masonry to the painted representation of a decorative masonry, and from laying the roofing directly over the vaults to laying the roofing over a wooden structure. Their purpose was not necessarily honesty as we understand it today, but a visual representation of hidden structural elements, just as the Ancient Greeks, as noted by Bötticher, used triglyphs to represent the end of rafters, hidden behind the frieze. The extension of the iconographic program from the interior to the façades or the red painting used for the exterior of certain monastery churches on Mount Athos (which is sometimes said to represent the blood of martyrs) are exceptions to the rule, the representational elements of the first kind being replaced by representational elements of the second kind.

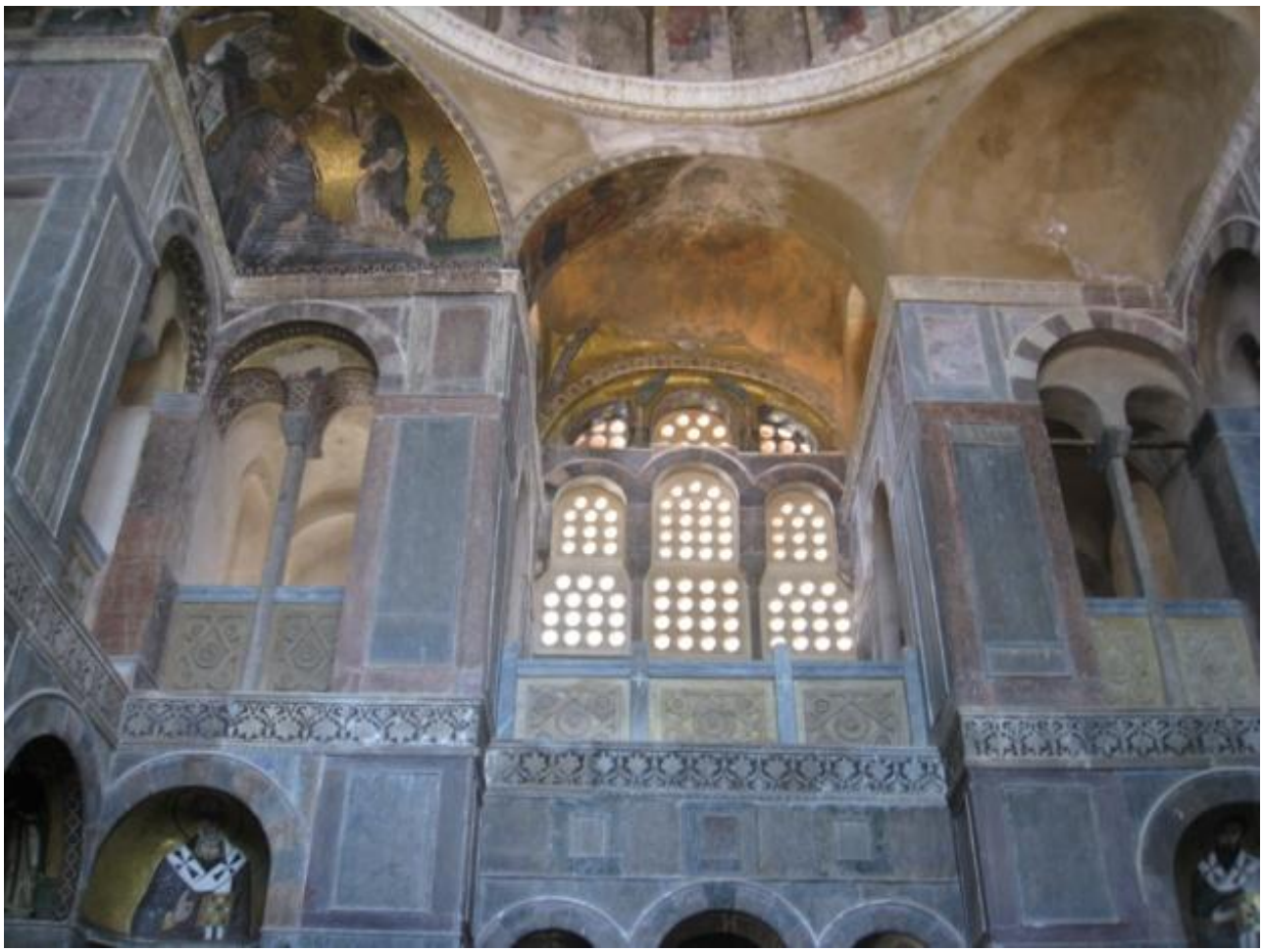

Fig. 4: The mosaics and marble claddings as representational elements which convey a symbolic meaning and which reveal in a discreet manner the constructive logic of the structure. Catholicon of Hosios Loukas monastery, Greece, 10th-11th century.

1.7 The Tectonic and Atectonic Aspects of Byzantine Church Architecture

In his book *Master Builders of Byzantium,*[34] an analysis of the Byzantine building technologies during the Middle and Late periods, Robert Ousterhout makes a case for the tectonic character of Byzantine architecture, or, in his words, "structural clarity". He argues that a concern for structural clarity may be discerned in Byzantine architecture slightly before the emergence of Romanesque and Gothic architecture in Western Europe.[35]

His favorite example of tructural clarity is the 11th century catholicon (main church) of the Hosios Loukas monastery in Greece. Here, the dome of the nave is supported by eight arches and eight piers; four squinches span the triangles between the octagon of arches and the corners of the square nave, where four additional piers rise to support them. This tall space is surrounded on three sides by two levels of subordinated spaces, while on the east side there are the sanctuary and its annex spaces. The surrounding smaller spaces have the structural purpose of countering the thrust of the dome and of bracing the tall, slender piers that surround it. The groin vaults of these small bays allow for the loads to be concentrated in the corners, so that the façade walls are reduced to piers and arches, with windows and non-load-bearing stone slabs under the arches and between the piers.[36]

[34] Ousterhout, Robert: Master Builders of Byzantium. Philadelphia, 2008.
[35] Master Builders of Byzantium, pp. 202-206.
[36] Master Builders of Byzantium, pp. 203-204.


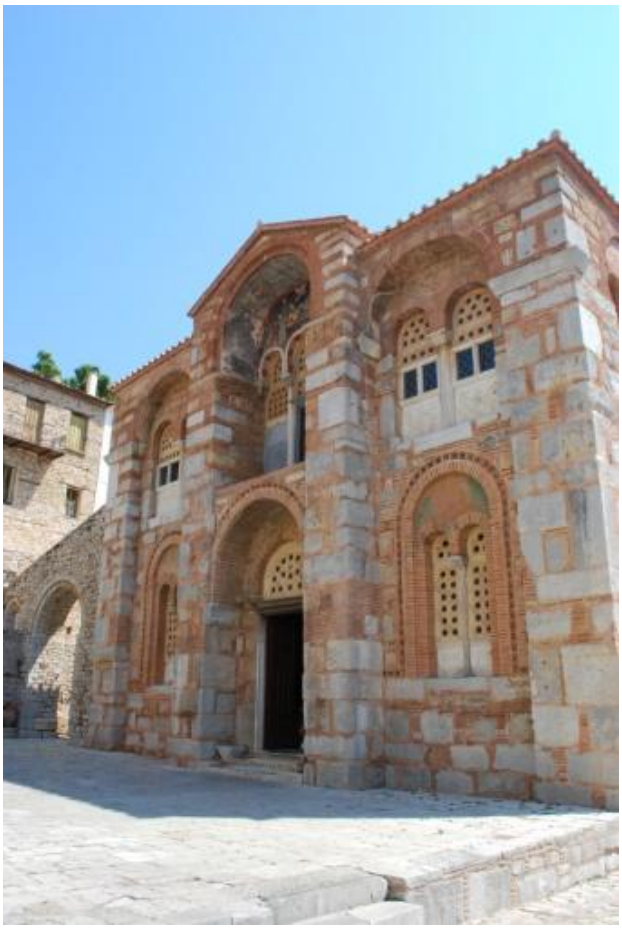

Fig. 5-6: Tectonic or structural clarity in Byzantine church architecture: Catholicon of Hosios Loukas monastery, Greece, 10th-11th century.

Another example is the 10th century Myrelaion Church of Constantinople, a very early and atypical example of a cross-in-square church. All eight outer bays feature groin vaults, allowing for the concentration of loads on the corners, which are marked on the brickwork façade with engaged columns. This arrangement allows for a façade composition inspired by Roman triumphal arches, comprising a larger arch flanked by two smaller arches. Ousterhout shows that originally the arches were almost entirely glazed, just as at Hosios Loukas, but later alterations significantly reduced the size of windows, so that something of the original aesthetic effect was lost.[37]

However, in Late Byzantine architecture a contrary trend existed as well, which Ousterhout suggestively calls "manneristic subversion of the structural clarity".[38] The term "manneristic" refers to the sophisticated play of Mannerist architects with the rules of classical composition instituted during the Renaissance. Similarly, occasionally Byzantine architects sought to achieve aesthetic effects by breaking the rules creatively, but not by abolishing them. Ousterhout emphasizes that the rule of structural clarity continues to exist,[39] and that any "manneristic subversion" of it is an exception.

The most striking of Ousterhout's examples is the south façade of the *parekklesion* of the Savior in Chora monastery from Constantinople (14th century). This façade is divided into three tiers: a plinth, a row of engaged columns flanked by responds, and a row of arches corresponding to the interior vaulting structure. A discreet cornice of protruding stone slabs separates the arch tier from the column tier. Most columns stand below the springing of the arches, suggesting visually that loads concentrate there. Two of the arches are much wider, which required the builders to quicken the rhythm of the façade with two additional columns,

[37] Master Builders of Byzantium, p. 206.
[38] Master Builders of Byzantium, p. 206.
[39] Master Builders of Byzantium, p. 207.

identical with the others in all details, but which seem to support windows instead of arches—an atectonic feature.[40]

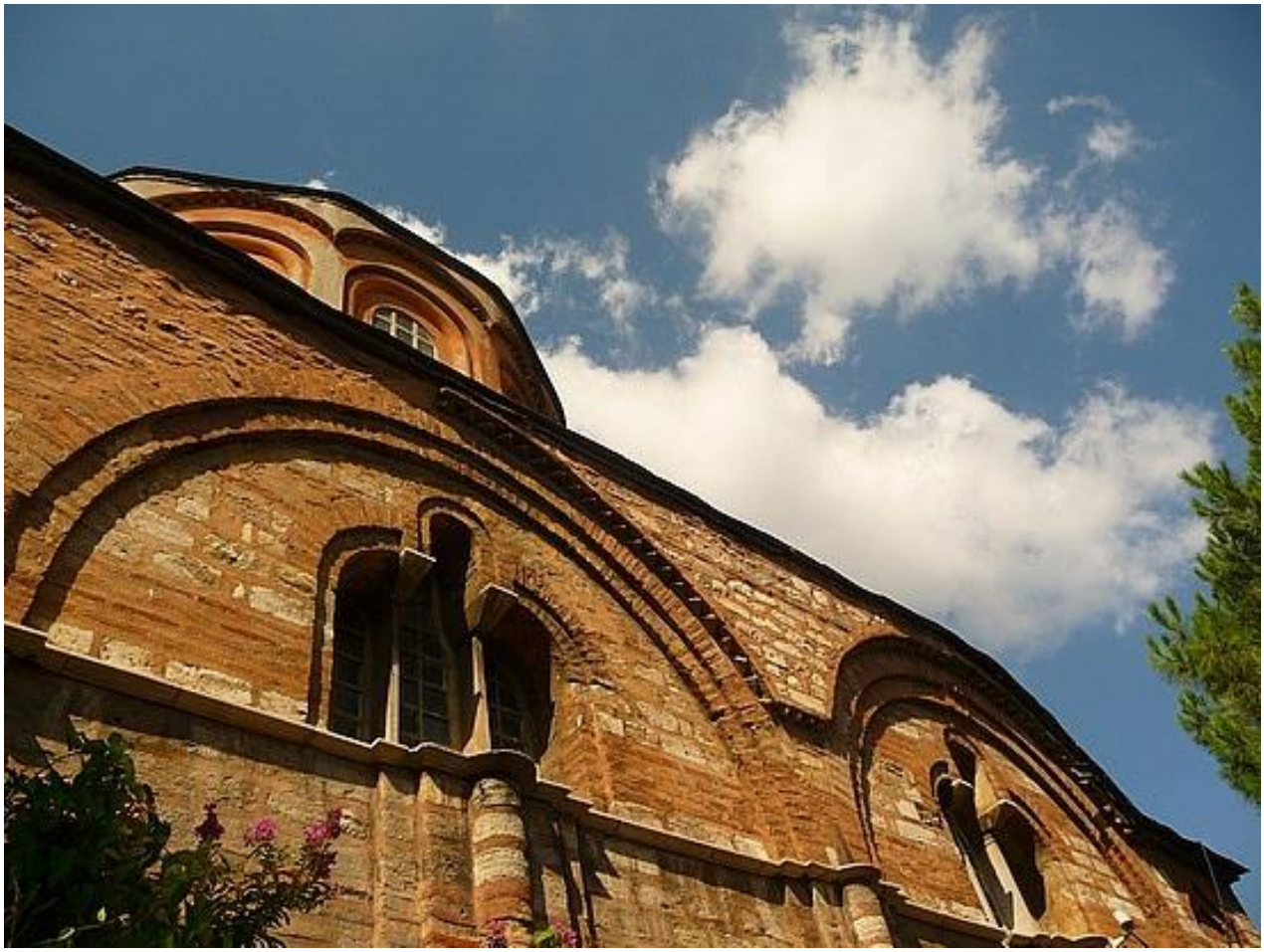

Fig. 7: Atectonic or the manneristic subversion of structural clarity in Byzantine architecture: Monastery Savior in Chora, Constantinople, south façade (of the *parekklesion),* 14th century. Detail showing how identical elements seem to carry the springing of decorative arches and the windows at the center of the arches.

Another example of a façade featuring an atectonic composition is that of the Pantokrator church from Nesebar, Bulgaria (14th century). Here, the façade is divided into tiers of decorative arches, each row having its own rhythm, so that arches from different tiers superpose randomly, in an atectonic manner. Ousterhout compares this type of composition to a Roman aqueduct.[41]

[40] Master Builders of Byzantium, pp. 206-207.
[41] Master Builders of Byzantium, p. 207.

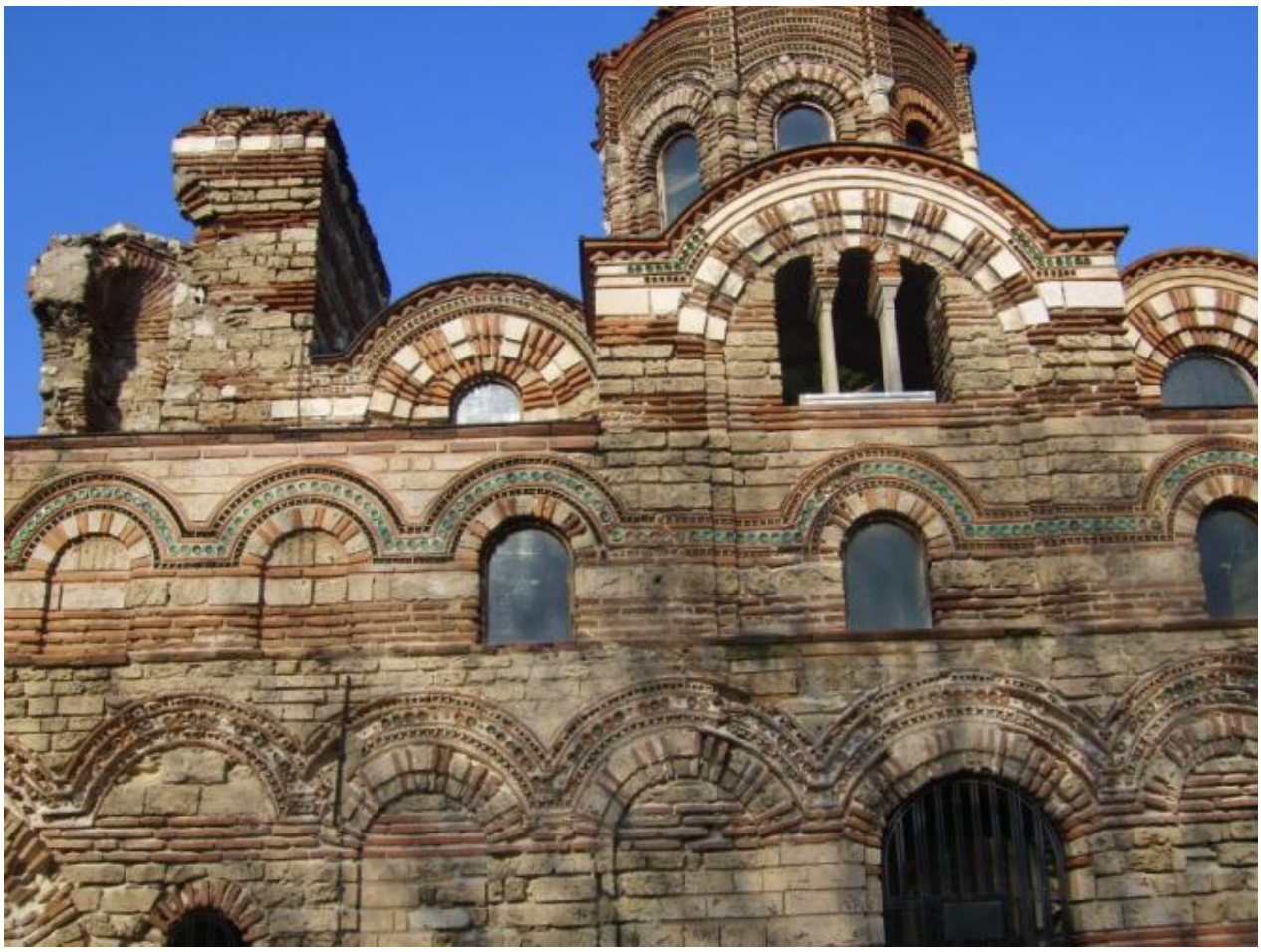

Fig. 8: Atectonic or the manneristic subversion of structural clarity in Byzantine architecture: Pantokrator church in Nesebar, Bulgaria, 14th century. Detail of south façade showing the tiers of decorative arches with out-of-step rhythms. Some of the arches have a correspondence with structural arches inside, but most do not.

However, in the Late Byzantine period, church architecture does not switch from tectonic to atectonic or, in Ousterhout's terms, from structural clarity to its subversion. As mentioned before, the atectonic aspects are only exceptions to the rule of structural clarity. These churches, are not purely atectonic, but oscillate gracefully between the tectonic character of the rule and the atectonic character of the exception, not unlike Peter Behrens' AEG building presented by Frampton.[42]

The issue of Byzantine church interiors and their supposedly atectonic character should be addressed as well. Much has been written, for example, on the spectacular visual effect of mosaics with gold background, drawing perhaps too hastily the conclusion that the intention of Byzantine artists was to "dematerialize" the structural elements of church buildings, dissolving them into light. However, this is a conclusion of the 20th century modernist authors, such as Bruno Zevi;[43] in the 19th century, John Ruskin felt that the gilding of architectural elements could not possibly deceive anybody as to their nature.[44] The Byzantines wished to create an unearthly, heavenly atmosphere, filled with golden light as a symbol of the uncreated light that will make the sun useless in the Heavenly Jerusalem.[45] They intended not the dematerialization, but the transfiguration of matter through light.[46]

The same conclusion was reached independently by American architect Andrew Gould, a faithful Orthodox Christian and author of several Orthodox church designs in the US. His text, "On Earth as It Is in Heaven:

[42] Studies in Tectonic Culture, p. 21.
[43] Zevi, Bruno: Architecture as Space: How to Look at architecture. New York, 1974, p. 87.
[44] Ruskin, John: The Seven Lamps of Architecture. London, 1885, p. 29. Available online at http://www.archive.org/details/thesevenlampsofa35898gut
[45] Revelation 21:18; 21:23; 22:5.
[46] I wrote about the quality and meaning of light in church interiors in:
Botez, Ana: Relaţia dintre lumină, material şi formă în arhitectura bisericilor răsăritene. In: Analele Arhitecturii, year 4, No. 1/2010, pp. 49-62.

Form and Meaning in Orthodox Architecture,"[47] is a meditation on traditional Orthodox church architecture, scholarly as much as personal, based on his liturgical experience as an Orthodox Christian, on his travels and pilgrimages, and on his professional experience as a designing architect. He first describes how Gothic architecture tends towards dematerialization:

> A Gothic church is a monument offered up to God… an attempt by man to order and beautify all that exists in creation. It points upward to God the Father who is outside of it, and prayers are directed likewise… Light pours into a Gothic church through great decorated windows. Broken into dazzling colors, it overwhelms the materiality of the walls. The stonework itself magnifies the effect, as it is thin and delicate, and carven[48] with most delicate tracery. The weight of the stone is denied. The worshipper is at once conscious of the awesome radiance and power of the light without and the tenuous structure of the material within. The **light beautifies the structure by dematerializing it,** even until the stone itself looks like rays of light.[49] (My emphasis)

He then goes on to explain how Byzantine and post-Byzantine architecture tends towards the transfiguration of matter:

> …an Orthodox church is introverted. The interior represents heaven, and to enter it is to step into the New Jerusalem. God dwells there among men, and they have no need of the sun, neither of the moon, for the Glory of God illumines it (*cf.* Revelation 21:23)… The light is seen reflected off the thickness of the wall, rather than directly from the windows… Gold mosaics or bright frescoes play the light from many surfaces. Polished lamps and inlaid furniture reflect highlights from every direction. Deep aisles or side chapels behind arches appear as mysterious shadows in the distance, which make the church look brighter by the rich contrast. This is **mass transfigured by light.** It is the **same light as in the icons,** holy and all-pervading, **the Uncreated Light which emanates from God to His creation.** The stone and plaster glow from within. They do not seem transitory, but more real. Walls and piers seem as silent and as still as ancient mountains. They are bathed with the Light of Christ, and are sustained and strengthened by it as we are.[50] (My emphasis)

As mentioned above, the "tapestry" of mosaics and marbles and the "veil" of frescoes hide the make-up of structural elements without hiding their geometric configuration, from which the logic of the structural system can be inferred. Although this layer, especially in the case of mosaics, changes radically the materiality of the masonry behind it, the intention is not to dematerialize the construction or to deny its configuration and structural logic, but to symbolize the transfigured matter of the Heavenly Jerusalem. If we consider that exteriors have a markedly tectonic character, the idea of atectonic interiors becomes difficult to sustain. Of course, there are also exceptions, cases when the architects used artifices to visually lighten the construction, such as camouflaging the massive piers supporting the dome of Hagia Sophia (6th century), and piercing the base of the same dome with no less than forty windows.[51]

[47] Gould, Andrew: On Earth as It Is in Heaven: Form and Meaning in Orthodox Architecture. Available online at http://andrewgoulddesign.com/ accessed on 05/07/2011.
[48] *Carven*—an archaic form of *carved.*
[49] On Earth as It Is in Heaven, p. 2.
[50] On Earth as It Is in Heaven, pp. 2-3.
[51] Krautheimer, Richard: Early Christian and Byzantine Architecture, fourth edition revised by Richard Krautheimer and Slobodan Ćurčić. New Haven and London, 1986, pp. 205-219.

Fig. 9: An atectonic effect in a tectonic conception: gold foil mosaics. Church of Savior in Chora monastery, Constantinople, southern dome of esonarthex, 11th-14th century.

Fig. 10: An atectonic effect in a tectonic conception: the disappearance of the massive piers which support the load of the main dome and the four great arches "behind" the lace-like screen between the nave and the aisles at Hagia Sophia, Constantinople, 532-537.

As with façade treatments, although in this case the masonry itself is never visible, the conception of Byzantine church interiors is primarily tectonic, and its atectonic aspects are secondary. The latter derive from two sources: either from the architects' intention to visually lighten a massive structure (especially in the case of the great churches in the Early Byzantine period, which needed strong structural members), or from the intention of connecting the iconographic concept with the natural lighting concept for a common symbolism (with strong atectonic effects especially in the case of interiors featuring mosaics).

CONCLUSION

This paper reviews the principles of tectonics as defined by Kenneth Frampton, applying them to aspects of Byzantine ecclesiastic architecture and insisting in those areas that are especially relevant. These principles, formulated by Frampton as a theoretical foundation for his book on 19th and 20th century architects who used successfully the constructive means for architectural expression, may be considered as relevant for the investigation of Byzantine architecture, which is also based on the expressivity of construction. It is helpful for the purpose of this research that Frampton conceives his work as an implicit critique to the mainstream modernist trend, which is the emphasis on space, geometric simplification and abstraction to the detriment of the constructive and the concrete.

It is remarkable that Frampton included ethnographic research on the symbolism of traditional architecture in his collection of tectonic principles. Found in all traditional cultures, cosmologic and spiritual symbolism opposes both the contemporary inclination to utilitarianism and commercialism and the apparently opposite inclination towards individualism and the exuberant expression of the architect's personality and originality. Knowing and understanding the complex symbolism of traditional church architecture is fundamental for understanding the reasons for which Orthodox church architecture cannot follow the trends mentioned above.

It is also very important to understand the manner in which we experience architecture through our bodies and senses. This non-visual perception is forgotten today by many architects because of the chiefly visual means used today for learning and for designing architecture. We have to go beyond the limitation of these means in order to learn the principles of traditional church architecture and to design in the spirit of tradition.

Equally important is the distinction that Frampton makes between the representational and the ontological elements of construction, based on the distinction made by Semper between symbolic and technical elements, and by Bötticher between the *Kunstform* (art form) and the *Kernform* (core form) of construction. Frampton also distinguishes between two types of representational elements: those that, standing in front of the structure, are its artistic and symbolic expression, and those that, standing in front of the structure, have and aesthetic and symbolic value independent of the structure and its constructive logic. The decorative masonry façades and the roofing that follows closely the extrados of the vaulting are representational elements of the first kind, while the frescoes, mosaics, and marble claddings are representational elements of the second kind. The latter, although hiding the masonry behind them, reveal its geometry, from which the constructive logic of the structure may be understood. The purpose was not the "honest use of materials" as we understand it today, but perhaps a visual representation of hidden structural members similar to that noted by Bötticher for the Ancient Greek temples. This is why occasionally, when necessary, the decorative masonry could replaced by painted plastering representing a decorative masonry, or the roofing could raised from the back of the vaults on a wooden structure; later, both design strategies were used often in Romanian Post-Byzantine architecture. The lack of emphasis on honesty explains as well how it was possible to replace this type of representational element with an element of the other type, when façades were covered by iconographic frescoes or by red paint. However, it is important to note that any decrease in the representation of structural logic is matched by an increase in the representation of symbolic meaning. By extension, this is an argument in favor of ornamentation, which in this classification is always a representational element or a part of such an element. Of course, this proves that the meaningless and gratuitous ornamentation of many new churches is as untraditional as the exceedingly abstract façade treatment in many of the church designs that were rejected by the client communities.

Another interesting distinction is that between tectonic and atectonic, which Frampton borrows from Eduard Sekler. Byzantine architecture has a tectonic character, in spite of a number of exceptions which introduce atectonic elements. Thus, in Late Byzantine architecture, there is a tendency towards certain manneristic exceptions to the general rule of the structural clarity of façades, a tendency which can be identified in Romanian Post-Byzantine architecture as well. In the case of interiors, we have several Early Byzantine

examples of visual lightening of those massive structural members required by the large spans and loads, as well as the atectonic character of interior finishing elements with iconographic character, most obvious for mosaics. Still, these elements that cover the masonry structure do not deny its structural logic, and even convey their symbolic meaning together with it, so that we may say that church interiors have a markedly tectonic character as well. As an important note, the symbolism of light makes it more appropriate to speak of the transfiguration of matter instead of "dematerialization" when referring to the visual effect of gold foil mosaics.

The purpose of these tectonic principles discerned in the design conception of Byzantine churches is to shed light on the Orthodox Christian architectural tradition and to provide guidelines for new church design in the spirit of this tradition. Avoiding the theoretical pitfalls of "honest use of materials" and "dematerialization" is a necessary step towards avoiding the pitfalls of applying Modernist principles such as the honest use of contemporary materials or the dematerialization of architecture by the extensive use of glass when attempting to create a traditional church design.

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