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INVESTIGATING GOTTFRIED SEMPER'S SYMBOLIC APPROACH TO THE SURFACE DESIGN IN HELLENISTIC ARCHITECTURE: THE CASE OF THE MACEDONIAN TOMBS

Naif A. Haddad*[1], Yasir M. Sakr [1] and Leen A. Fakhoury[2]

[1] Faculty of Architecture and Design, American University of Madaba (AUM), Madaba, Jordan
[2] School of Architecture and Built Environment, German Jordanian University, Amman, Jordan

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**Corresponding author: Naif A. Haddad (naif.haddad@aum.edu.jo)*

ABSTRACT

This paper investigates the applicability of the phenomenological approach articulated by the Nineteenth Century German architectural theoretician Gottfried Semper (1803–79) of "Cladding as the origin of architecture", to understand the surface design of Hellenistic Macedonian tomb architecture. The phenomenological approach to dematerialization in surface design, introduced by Semper, has never been investigated and studied in Hellenistic architecture. Based on Semper criteria, the study argues that Hellenistic architecture of the Macedonian tombs demonstrated a distinctive conceptual freedom of design, associated with the development of the masonry technology of semi-cylindrical barrel-vaulted chambers. This development endowed Hellenistic architectural and the morphology of its surface façade design continuous creativity and innovation. The study analyzes various examples of Macedonian tombs dated from the 4th to the 2nd centuries BCE. The aim of this research is to reveal crucial phenomenal aspects of cladding/masking of the Macedonian tomb's façade. Thus, dealing with its surface as an effect rather than an object, the study will shed light on a crucial reality that was censored in previous studies of Macedonian tombs architecture which considered it a lifeless mask. Based on Semper theory, the study will show that the issue of meaning in Hellenistic architecture is related to the manner with which surface design is approached. Thus, ornaments and decorations at its façades go beyond decorating, to become further tools for potent expression and cultural reference of the Oikoumene. As conclusion, Hellenistic surface façade design contributed to effective branding and image-making within its larger Pan-Mediterranean context of the Greco-Macedonian and Ptolemaic Alexandrian, Pompeian second style, Nabataean architecture and later the Renaissance. The hugely influential Oikoumene Hellenistic design approach may have a lasting impact on architectural design even today.

KEYWORDS: Hellenistic architecture, Dematerialization, Philip II Tomb, Macedonian Tombs, Vault design, Greco-Macedonian, Surface design, Research through design.

1. GENERAL INTRODUCTION TO THE MATERIALIST APPROACH TO CLASSICAL GREEK ARCHITECTURE

Classical Greek architecture and Stereotomy feature the orders of antiquity and their associated elements, as a model for a stone/ marble construction, in which principles of "Composition and Construction are given as a result of exact proportional correspondence and numerical relations" (Annalisa di Roma, 2003, 765).

This ideal model focused on the aesthetic code of proportions and associations between elements of order, based on the principles of rhythm and harmony. In Classical Greek architectural design, there is a stabilized and long-established functional and structural materialist approach which is tectonic. Each architectural element has its structural role. The tectonic (structural) nature of Classical Greek architectural design, involves the use of a post- and -lintel system of straight stone beams, in which each element has a specific structural purpose.

According to the German archeologist Karl Bötticher, "Tectonic referring to Greek architecture means exact and congruent functions of the members into the *order*'s system according to their structural role" (Annalisa di Roma, 2003, 768). Thus, structure dictated the appearance to the extent that every key structural element played an essential part in the whole system of the classical orders (Lyttleton, 1974, 69; Haddad, 2018, 25). In fact, we can discern in the scholars of classical Greek architecture, deeply rooted ideas of functionalist design and the insistence on the legibility of function and material.

A recent study of the classical Greek architectural design argues that "the building proportions derived from elements at the *stylobate* level produce systematically higher levels of significance than features further up in the façade. The most probable explanation for this observation is that the Greek temples were designed from bottom up and not top down: they are 'plan-driven' rather than 'facade-driven'" (Pakkanen, 2013, 111).

On the other hand, classical Greek architectural ornaments are features present either in single small scale architectural forms/ motifs resulting from the main form of the building, or stemming parts of the main structure, as in the case of the Ionic, Doric, and Corinthian columns (Bothireddy, 2007; Elrayies, 2018, 13).

Massey (2013) stated that ornaments "expressed the building's purpose, status, and character from the ornamentation's order, the proportion, the details of mouldings, and motif configurations that formed by mythology, history, and the military" (Elrayies, 2018, 14). In architecture, though, ornament contains "all the shapes and patterns which humans have applied to their surroundings. It connects content and form - an elaboration in which the visual appeal of form takes precedence over the emotional one of content" (Lee-Niinioja, 2014, 6).

Ornament also "links parts of an object, signifying the relationship of one part to another in a building and bringing life to the empty spaces" (Lee-Niinioja, 2014, 6). The symbolic aspect of ornaments makes the building an icon and a landmark, according to Balik and Allmer (2016), and states the building functionally and aesthetically together.

We are thus led to assume that Classical Greek architects are as modernists materialists' architects who believed that surface façade decoration/ ornamentation fakes the pureness and clarity of the form (Siwalatri et al., 2012; Riisberg & Munch, 2015).

Inherent modernist scholars conceived the ornament as being inappropriate in terms of function, construction and materiality. Actually, in the materialist design approach, the prior attention is given to precision, geometry and functionality of the built form. In this case, "the surface only performs a complementary role, that is, to literally express the functional inner content on the surface in the most aesthetically acceptable manner" (Al Hassani, 2004, 1).

This treatment might reflect Wagner's conviction that "the architect must always develop the form of art from construction" (Mallgrave, 1996, 369). The materialism views surface design is simply a product of the objectification of the façade[1].

2. DEMATERIALIZATION CONCEPT IN HELLENISTIC ARCHITECTURE

An alternative to the Materialist approach to Classical Greek architecture is to be based on the principle of dematerialization which "calls for greater attention to symbolic aspects of design; thus all other material aspects would be subordinated to the idea" (Al Hassani, 2004, h). A case in point is Hellenistic architecture.

Early Hellenistic architecture which sustained the use of the classical orders and their ornaments, was more concerned with the surface manifestation than the structural and construction integrity (Haddad, 2018).

In Hellenistic architecture, according to Annalisa di Roma (2003, 767), "What initially might appear as a new form or as an added form to the ornamentation, is evidence of how the tectonic quality of building elements have lost their original strength". It emphasized "more the aesthetic and stylistic aspects rather than the classical typical functional structural approach" (Haddad, 2013; 2018, 10).

During the Hellenistic period, contrary to the Greek Classical approach, the association between

decoration and building's profile set in motion new combinations by which "an enrichment of the formal repertory, made up of different styles and traditions, takes place" (Annalisa di Roma, 2003, 768).

In the case of the architecture of the Hellenistic Macedonian tombs **(see Fig. 1)**, which involved the transition from horizontal slabs to barrel-vaulted roofs (Haddad, 2015), in their façade surface treatment, the real and deep impact that affected the surface conception and design was the outcome of the separation of the a-tectonic façade cladding/mask from the tectonic structural and functional tomb vaulted chamber(s).

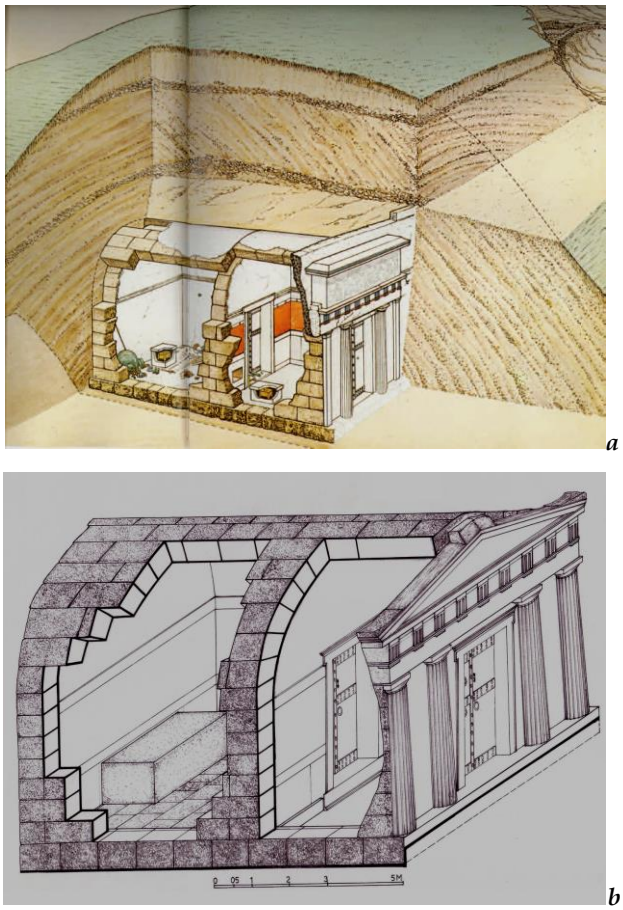

Figure 1. a) 3D reconstruction drawing of Philip II tomb from the Great tumulus at Vergina (after Andronikos 1989, 99). Behind the Doric façade we can see the antechamber and the main chamber, the marble door connecting them, the barrel-vault and the tumulus. b) Axonometric reconstruction of the Macedonian tomb D at Pella. (Haddad, 1999, 165).

As will be shown, this surface treatment was associated with the technological spread of the semi-cylinder vault revolution of the middle of the fourth century BCE from Macedonia north of Greece (Haddad 2015, 2018). We can observe that, the semi-cylindrical barrel vaulted tombs during the early Hellenistic period became most spread in Macedonia, just as the beehive *tholos* tombs became widespread in Thrace (Haddad, 2015).

On the other hand, the stylistic "Proto-baroque" tendency of Hellenistic and the architecture of the Macedonian tombs provided a wide range of content by providing more alternative guises. Baroque is characterized by the use of structural elements as surface decoration and the use of new forms of entablature and pediments (McKenzie, 1990, 87-88, Haddad, 2018). Lyttleton (1974, 11), in describing the difference between the Classic and Baroque argued that while in both styles unity is the chief aim, in the former, unity is achieved by harmony of free parts, while in the latter by a union of the parts in single theme, or by their subordination to one.

In other words, the apparition of the Hellenistic building/tomb façade as a mask/screen declared the separation between the exterior a-tectonic morphology of forms from the interior tectonic function.

More specifically, the façade surface is considered as a threshold, a space of exchange, and not as a borderline between inside and outsid. To conclude, the Macedonian tombs' construction technique and variety of cladding/ masking materials (mainly plaster, engaged orders, painting, and marble) caused this separation to be not only physical but also conceptual [2].

In this study, we apply Gottfried Semper's "phenomenological" approach to surface design in Hellenistic architecture, as an immaterial and symbolic reality [3]. We argue that the main purpose of the Hellenistic Macedonian tomb's façade, far from expressing only function or structure; is primarily expressing symbolic content.

The facade was not conceived as an object but an effect. Through its ornamentation, dematerialization lies in rejecting literalism for the sake of symbolic expression. The physical aspect of ornamentation can be encountered in one, or more of five visible aspects: structural, cladding, pattern, surface, and color (Elrayies, 2018, 15, 23).

These distinctive aspects will be explored and throughout this paper to offer a new clear understanding of the notion of Hellenistic Macedonian dematerialization and recognition of phases it underwent. The phenomenological approach to dematerialization in surface design introduced by Semper has never been investigated and studied in Hellenistic architecture.

3. THE THEORETICAL BASIS TO SURFACE DESIGN IN THE 19TH CENTURY: GOTTFRIED SEMPER'S THEORY OF CLADDING

A father of the materialistic approach of architectural thinking, the Roman architect Vitruvius be-

lieved that the Greek temple was derived from wooden structures. Vitruvius asserted that the origin of architecture is structure. The structural form, preceded the ornamental form i.e. the orders (Madrazo, 1995, 242).

The emphasis on revealing functional determinants on the form of the building is also evident in Alberti's (1404-1472) insistence on the legibility of function and structural rules on the surface (Al Hassan, 2004, 77).

Alberti, in fact, had opened the loom for a materialist approach to surface design as he called for revealing its material reality in its purest form. Alberti may have influenced the modernist architects' rejection of all kinds of ornamentation and insistence that the beautiful is to be functional. Masking for Alberti, if needed, was used as a transparent veil which should exactly accentuate what lies underneath; a tool of accentuation and not that of dissimulation (Alberti, 1988).

He considered the inner space of the building, with all the functions it accommodates, to be the content which the form of the building should express (Al Hassan, 2004, 67; Madrazo, 1995, 108). To him, the scheme of representation on the surface cannot be separated from the interior space. The objectification of the façade was implied in Alberti's idea that the ornamentation of the wall was used to cover the ugly and polish the attractive (Madrazo, 1995, 106).

3.1 Gottfried Semper's Concept of Dematerialization

Gottfried Semper (1803–79) –a German architect, theorist, art critic and professor of architecture– together with well-known theorists of the nineteenth century, like Bötticher, Hübsch, Viollet-le-Duc – rejected the previous theory of the origin of architectural forms; basically the theory of the primitive wooden construction by Vitruvius. To those theorists the visual similarity between "the form of the hut and the form of the Greek temple was not enough reason to maintain that the last derived from the former" (Madrazo, 1995, 227).

Semper [4] declared that the assertion that the wood structure was the origin of architecture is a materialistic way of thinking and he rejected the conception of the derivation of the Greek temple form associated with it. Semper thought that the similarity of external forms was "not enough reason to postulate any relation between what he thought to be two different kinds of form: the primitive construction and the Greek temple" (Madrazo, 1995, 240; Semper, 1989, 102-3).

He upheld the denial of the physical reality through masking for the sake of the symbolic content:

"Dressing and the mask are as old as human civilization and that the joy in both is identical to the joy in those things that led men to sculptors, painters, architects, poets, ... The destruction of reality, of the material, is necessary if form to emerge as a meaningful symbol… The truly great masters in every field returned to it, except that in times of high artistic achievement these individuals also masked the material of the mask." (Semper, 2004, 438–9).

Semper attempted to do away with a theory of imitation that had prevailed since the time of Vitruvius. The impact of Semper's theory was described by Frampton (1995) as "liberating the mind from the stereotomic use of matter, and focusing instead on a reticulation of the surface, and thus on a dematerialization" (Frampton, 1995, 88). According to Frampton (1995), Semper considered surface forms and applied colors as a symbol of human events.

Semper rejected the historical priority of structure with regard to ornament and contends that decoration was first and that structural form came after (Madrazo, 1995, 242; Semper, 1989).

To him the building material is only one of the factors that determine the art form (Semper, 1989; Madrazo, 1995, 243). Accordingly, Elrayies (2018, 24) concluded that "Forms of ornamentation may differ, while the reasons have remained the same. The ornamentation was, and has become, an expressive tool that testifies to the technology and science, the civilisation of people, their evolution, their cultures and beliefs, their social and economic circumstances, and their environmental awareness, all of which are the factors which draw the identities of people, cities and nations".

Al Hassani (2004, 45-6) rightly clarified that Semper does not mean that "the role of structure is negligible; on the contrary, structure is used as a means to realize the design and bring it into existence, keeping in mind that structure and materials are subordinate to the idea expressed in the surface". Semper considers architecture as a phenomenon, a formal symbolization of human events.

Semper's theory of cladding gave primacy by all means to the surface as the origin and the generator of architectural design (cladding as the origin of architecture). He had, in fact, "de-materialized the wall for the sake of the expression" (Al Hassani, 2004, 26). We can assume that Gottfried Semper introduced cladding and its ornamentation, as the true representation of the wall (Mallgrave, 1996; Frampton 1995; Loos, 1982). He insisted on completely hiding the structure behind the surface.

One can summarize Semper's criteria of cladding (cladding as the origin of architecture) which underlies his concept of dematerialization as follows:

- Architecture consisted mainly of Hearth/Hestia and cloth; the immaterial center point of social gathering wrapped by means of a symbolic representation of individual and collective culture, memories and aspirations.
- Architecture begins with ornament which is not simply the decoration of naked structures.
- He considered the textile art as the origin of architecture. His rationalization of the origin of architecture being in textile art, gave dominance to surface over all other considerations. He stated that "the beginning of building coincides with the beginning of textiles" (Semper, 2004. § 62, p.247)
- Textile, ornament and building surface are neither elements located within space to mark certain its introversion, nor forms supplying a physical shelter.
- The façade for him is the content itself. Confronting the materialist approach displacing surface design, Semper's theory affirms that materials, form, structure, construction technology even all the related aspects of design are never intended for their material realities; "but as tools to render all subordinated to the symbolic content on the surface" (Al Hassan, 2004, 126).
- The surface itself is a space of exchange of information, emotions and effects of various human events. In affirming the supremacy of cladding over structure, the building surface becomes a symbolic representation of human events, and not of function or of structure.
- He gave textiles their independent nature as a space of exchange that implies not just being a borderline but a threshold, or a synchronized state of inside and outside (Semper, 1989).
- He considered the textile that was suspended on an enhancing structure, as a mask, of which the main job was to dissimulate rather than to express the structure.
- The textile surface was the first means of separating public from private space, thus indoor and outdoor were defined by the surface which was considered as the threshold between the two. In this sense, the enclosure may not only be considered physical; rather it's conceptual which maintains a social effect marked on the body of the individual in the form of a tattoo, and on the building surface as an ornament (Semper, 1989; Herrmann, 1989; Mallgrave, 1996).
- Through masking, he anticipated the formation of a tectonic veil, through which it would be possible to distinguish the spiritual significance of the constructional form, "as it lay suspended, between the pragmatic world of fact and the symbolic world of value" (Frampton, 1995, 90).

Thus, Semper moved the origins of architecture one step backwards from where Vitruvius had placed them (Madrazo, 1995, 241). His theory had "destabilized the common conception of building surface as simply a cover to protect naked structures (Al Hassani, 2004, 45). The reverse is adopted; architectural design actually starts from the surface, and that the Macedonian tombs' design, we assume, is a perfect case to argue this hypothesis.

4. TOWARDS UNDERSTANDING THE ARCHITECTURAL SIGNIFICANCE OF MACEDONIAN TOMB'S SURFACE FAÇADE

Archaeological studies have suggested that many aspects of material culture, were often used to differentiate social classes. A special case for this purpose were tombs (Mustafa, 2018, 29).

The Macedonian tombs represent a key field of investigation for our knowledge of ancient Greek and Hellenistic architecture, ornamentation and decoration, painting and construction techniques (Haddad, 1995; 1999).

Designed for the burials of the wealthiest members of society, they create a major category of funerary monuments whose use spread mainly in Macedonia north of Greece, during the late classical and Hellenistic period, from the middle of the fourth until the middle of 2nd century BCE, (Haddad, 2015; 2018, 5).

Their principal structural feature is a semicylindrical masonry barrel vaulted roof under tumuli. A spacious burial main chamber, square or rectangular proceeded by a much smaller vestibule/ antechamber, marks the ground plan of these tombs **(Fig. 1)** (Tomlinson, 1977, 473; Andronicos, 1987, 12; Haddad, 2015, 144).

a

b

Figure 2 . a) Façade of Philip II Tomb at Vergina with a fresco on the frieze depicting hunting scenes (after Andronikos 1989, 101). Photograph by Makis Skiadaressis. b) The Attica Tomb hunting painting.

The Macedonian tombs constitute a new resource in the artistic repertoire associated with the Hellenistic way of searching for symbolic, metaphoric, artistic abstraction and interaction with the classical functional and structural prototypes (Haddad, 2018).

They were constructed in local porous limestone covered with stucco. Many times, the architectural plastered skin of the façade and of the interior are emphasized by various painted colored decoration. In some astonishing cases remarkable painted compositions decorate large portion of the plastered façade such as the Philip's II Tomb (336 BCE) (**Fig. 1, 2**) in the Great Tumulus at Vergina Royal necropolis (Andronikos, 1984, 96-116) or the tomb of Aghios Athanassios (Tsimbidou-Avlonitou 2005, 173).

Only recently, the originality of their chamber(s) structure, façade articulation, and decoration have rendered these unique tombs as a desirable scholarly subject, not only in the fields of archaeology but also in the history of art and architecture (Haddad, 1995; 1999, 2013; 2015; 2018).

From over than 100 Macedonian tombs, we have well preserved and remarkable enough great variety of façade formations. These façade themes/concepts can provide information concerning their artistic and technical evolution and propose reciprocal influences in the architecture of the ancient world.

In other respects, each of these monuments displays own special features (Winter, 2006, 274). However, little has been written by architectural historians about their architectural façades' notions, formations and decorations, not to mention the lacking comparative studies of their architectural and morphological aspects.

Figure 3. The back interior wall with the false façade of the main chamber of the Macedonian tomb of Eurydice (340 BCE), in Vergina (Andronicos, 1993. 101, Fig. 57).

Theatricality was a tendency that characterized the Hellenistic Macedonian architecture of the fourth century BCE. It was reflected in the Macedonian tomb architecture. As Burn affirms "taking advantages of this tendency there to start to develop an interest in and an ability to both architecture and sculpture, to create feeling not just of awe and admiration but also of surprise, drama and excitement" (Burn, 2004, 84).

The formation using false door and windows at the Eurydice tomb (around 340 BCE) (**Fig. 3**), located south of the Great Tumulus in Vergina, and the façade of the two floors complex of the "Great Tomb" at Lefkadia, from the end of the fourth century BCE (**Fig. 4**), are some of the many examples of this tendency of the theatrical pictorial elaboration of the surface design approach. These examples show that the false windows theme were in parallel use in both of the Macedonian tombs and the free-standing Hellenistic architectural palatial complex of Vergina (350 BCE) (**Fig. 5**) and Pella (Haddad, 2018, 35).

Figure 4. Façade reconstruction by Ch. Lefakis of the Two Floors Façade of the Macedonian "Great Tomb" at Lefkadia (Petsas, 1966, Plate 1)

Figure 5. Graphical reconstruction of the Macedonian Palace of ancient Aegai (Vergina) Macedonia North Greece. (After https://www.pinterest.com/pin/572520171364411051/?lp=true fig 4 Vergina Palace).

From the start, the articulation of the Macedonian tomb's façade is conceived as an independent screen/mask placed in front of the vaulted structure confirming a theatrical/scenographic effect, rather than an organic and logical element of a unified structure (Haddad, 1999; 2013, 106-7; 2018, 8). The tomb's façade itself, whose side edges usually extend beyond the boundaries of the main vaulted camber behind it, had no proper connection with the latter. The disconnection of the façade cladding from the structural vaulted chamber triggered continuous combinations affirming the primacy of cladding over the façade mask-screen. This instigated the departure and disconnection from the grand classical tradition and its prototypes whereby form became independent from function (Haddad, 2013; 2018). Numerous original architectural themes were created to resolve the predicament of joining the functional/ structural semi-cylindrical vault with the symbolic mask of the façade. Their roles, thus, as architectural symbols opened up the opportunity of developing the "a-tectonic façade" (Haddad, 2013; 2018).

The separation and disconnection between the functional vaulted structural elements, surface decorative form and, the morphological façade treatments with its exaggerated emotional and scenographic effects gradually determined the design the screened masked facades of the Hellenistic world (Haddad, 2018, 9, 23). The outcome was the creation of a new expression/direction and architectural spirit, which was fully adopted by the early Hellenistic architecture and creatively applied in the architecture of the Macedonian tombs (Haddad, 2018,4). The complete separation of the tomb space design from its external surface caused the reduction of architecture into mere screens concealing construction and its spatial distribution.

Exploring numerous examples of Macedonian tombs' façades will underscore how the tomb façade eventually become the mask surface. In them we find for the first time the use of explicit Greek classical architectural elements in "a new image and brand adjusted to harmonize better with the new Greek architectural practices" (Haddad, 2018, 3). Each tomb's architect, though, managed to subordinate structure and material to the idea, although all were adopting different approaches, yielding various results. We can demonstrate that the Macedonian tombs façades architecture represent the symbolic content through the pictorial symbolic illusion of architecture.

We have to admit that in rare Macedonian tombs' cases the surface façade was a reflection of the internal organization of the vaulted structure, thus emphasizing more the materialist physical aspects of the design. These cases confirmed the difference between load bearing structure and applied façade surface material. The pattern of the external surface of the Macedonian tomb façade II in New Kerdyllion at Amphipolis (Haddad, 1995, plate 27, b), and the facade of Macedonian tomb of Aghios Athanasios IV (Tsimbidou-Avlonitou, 1995) (**Fig. 6**) denoting the cross section of the internal structural cross vault organization of the tomb indicate that subjective symbolic interpretation of the surface was not provided nor

intended. These few examples may look far from what Semper had initially intended in his theory of cladding.

In emphasizing its internal structural organization, this exceptional case of tomb façade seems to contradict the call for the annihilation of the structure for the sake of the architectural symbolic representation on its surface (Semper 1989; Al Hassani 2004, 70, 72). These few cases in expressing internal organization and structure on the surface, emphasized materialist and physical aspects of the design.

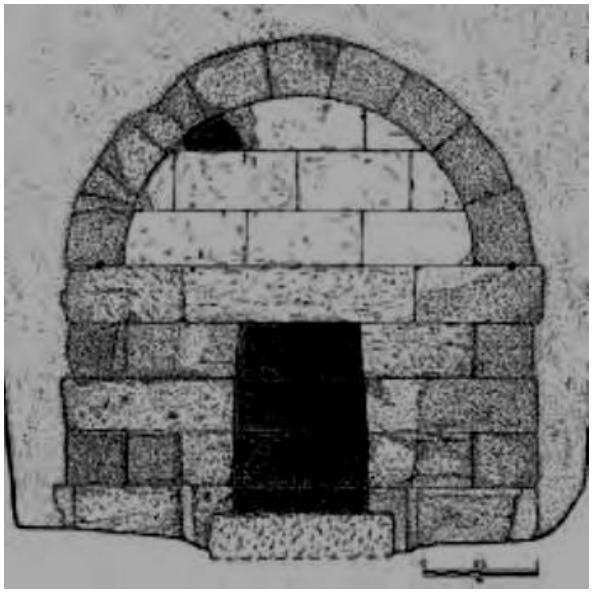

Figure 6. The Facade of Macedonian tomb of Aghios Athanasios IV (Tsimbidou-Avlonitou, 1995, 474, Fig. 9).

This study investigates the two dominant approaches to the design of the surface/mask in Hellenistic architecture which were evident in the evolution of the Macedonian tombs. Chronologically, the employment of the mask/screen surface façade to produce symbolic pictorial effect and illusionism can be clearly recognized, according to Haddad, 1995, 1999, 2013; 2018, 10-11), in two particular trends/phases of the development of the Macedonian tomb's façade conception.

The first phase berween (340-300 BCE) is marked by the use of certain structural elements at the façade as surface mask decoration. This phase primarily features the use of false doorways and windows, Attica painting, engaged columns and pilasters attached by the façade screen-walls. The second phase between (3rd to 2nd Century BCE) utilizes new forms of pediments, entablatures and symbolic themes as surface decoration in association with the tomb's central doorway which was the only functional element visible on the façade.

5. THE SURFACED ORNATE STRUCTURE DEMATERIALIZATING THE TOMB'S FAÇADE ARCHITECTURE

The first early phase (340-300 BCE) of the Macedonian tomb's façade, can be considered as a result of the evolution of the materialist classical approach to surface design. The tomb's façade image was considered the sole aim of the design introducing sometimes abstracted symbols.

The design is no longer what the façade is but rather is what its image is; as an effect of a theoretical division between the tomb façade surface and the vaulted functional/ structural space. As mentioned, in order to articulate many of the early plethora Macedonian tombs (Macedonian tombs I, VII in Vergina, New tomb in Lefkadia and Tomb III in Pella), the architects were required to extend the width of the wall façade beyond the span of the vaulted chamber structure (Haddad, 2013; 2018, 9, note23).

Moreover, at the Great Lefkadia tomb an interior single storey was fronted by two storey façade **(Fig. 4)**, of which the lower storey included human figures framed by the engaged columns order, thus, creating a dialogue between human bodies and semi-columns. These examples are a clear evidence of an autonomous application of cladding the surface façade regardless of the structural function vault behind. These surface treatments call attention to the emotional and scenographic effects; the movement effect which covers up the screen/mask of the Hellenistic façade Oikoumene.

In this early phase, the Macedonian tomb's architecture shows that the aesthetic thematic values were not only related to direct material image, but to expression, character, content, and effects. The Macedonian tomb phenomenal approach to surface design replaced the materialist approach.

The façade's surface never separated spaces, even though, the visual qualities of the surface/ mask of the tomb façade were developed separately from the inner chambers' structural tectonic conditions. The design of tomb's façade was no longer ojectified. Its structure and materials were intended only as means to achieve the symbolic content and achieve a respective desired effect.

In this phase their architecture makes way for novel application of new approaches to the Hellenistic surface design. This was associated with the beginning of an understanding of the structural mechanics of the semi-cylindrical masonry barrel-vaulted roofed chambers under tumuli which was applied extensively (Haddad, 2015; 2018, 8). The whole structure appeared as a symbol of the technical development of that time.

A recent study confirms that already the earliest Macedonian tomb of "Eurydice" (around 340 BCE) (**Fig. 3**), exhibited such "high structural integrity and strength, demonstrating the ability of early Hellenistic architects to construct extremely safe barrel vaulting structures" (Haddad, 2015, 143).

However, besides the vault's structural and functional aspects, the development in building technology demonstrated an emergent outlook. Its architecture revealed a significant aspect of perceiving the whole building as a cultural symbol.

The evolution of the tomb's façade suggests a shift to experimentation in interpreting the surface, space and content all as one entity. Its façade's chronological evolution may be considered as a novel interpretation of Semper's vision of the surface/mask as the origin of architecture. Semper considered architecture as an effect of the social gathering, interaction, memories and emotions associated with human festive events :

"Every artistic creation, every artistic pleasure, presumes a certain carnival spirit, or to express it in a modern way, the haze of carnival candles is the true atmosphere of art."(Semper, 2004, 438–9).

Indeed, the function of the Macedonian tomb's building and its structure was festive in nature. It was made particularly for an event embedding the traditions of the epoch which underscores Semper's version of the origin of architecture.

The funerary ceremony started by erecting a temporary wooden structure, to accompany the deceased to death. At least two evidences of traces of Hut/ house of the dead were found at the oldest tombs of Eurydice (around 340 BCE) and Philip II tomb (336 BCE) in Vergina / Aegae- the old Macedonian capital.

At the tomb of Eurydice, the mother of Philip II, the dead Queen was cremated in a funerary pyre which was completely exceptional: a whole wooden Hut/dead-house, equipped with a wooden door decorated with bronze ornaments, was constructed to accompany the deceased.

The actual marble cladded door of the tomb is almost identical in dimensions and ornamental patterns to that of the wooden door of the ephemeral wooden funerary structure. The cremated bones of the deceased hidden in a marble chest were placed on the elaborate throne, in front of the image of Persephone, as the ultimate offering to the mistress of the Underworld (**Fig. 3**).This tomb might be considered analogous to the Caribbean Hut presented by Semper as the most primitive model of architecture.

Remarkably, Semper cited what could be considered Greek precursors of the Macedonian tombs, as a case of this transformation of ephemeral ritual structures which are associated with the primitive crafts of weaving and carpentry. These are the two Lycian tombs in Southern Anatolia with rich decoration of the tomb's walls, which he illustrated in §62 of his Der Stijl and are currently in the British Museum **(Fig. 7)**.

These free standing vaulted tombs from Xanthos, feature painted reliefs between the joists and crowned by a sarcophagus-like top—that is, a stone representation of funeral pyres made of wood and covered with carpets, or, 'a funeral pyre monumentally conceived' (Semper, 2004, §62, p.249). Lycia was rapidly Hellenized under the Macedonians.

Figure. 7 The free standing tomb of Payava/ Lycia (375-360 BCE). The tomb is of a typical Lycian style, carved from stone but accurately depicting a wooden structure. https://joyofmuseums.com/museums/united-kingdom museums/london-museums/british-museum/tomb-of-payava/

Another compelling example of the aforementioned hut structures, was Philip II funerary pyre, made of wood and mud bricks. According to Kottaridou (1999, 115) Philip's II burial was "probably the most glorious funerary ceremony that took place in Greece in historic times. Only Hephaistion's burial in Babylon was more luxurious; however, even there, the traditional customs had to be followed".

In essence, Eurydice and Philip II tombs are similar, in reflecting the rapid development of the vaulting construction technology within five years. Their common festive function is associated with the gathering of public on certain occasions. As will be shown in Eurydice tomb, the crucial pictorial effect

of the surface/ mask is of the perfected colored architectural decorations typical of tombs which were recovered.

The interior of the rear wall of the tomb's chamber is decorated in the cist tomb approach; the cist is partitioned into the interior decorated with elaborate Ionic engaged order façade fashioned as if it was the exterior surface façade of a building. It is decorated with *tetrastyle* false façade with three bays divided by two engaged Ionic semi-columns and two other quarter-columns attached to projecting pilasters connected by screen-mask surface wall. The central intercolumniation is decorated by a central false Doric doorway, while the two side ones are decorated by two false Doric windows executed in the same style.

Indeed, the magnificent interior decoration of the tomb "strongly suggests a fully developed and sophisticated style, as the interior rear wall of the burial chamber would become a model to follow in the latter part of the fourth century (after 340 BCE)" (Haddad, 2018, 13, note 39).

In fact, the parallel existence of false windows at the interior back wall of the main chamber in the colored Eurydice's tomb and Vergina palace (350 BCE) (**Fig. 5**), and at the façade of the Great tomb at Lefkadia) (**Fig. 4**) refer to the new tendency of the Hellenistic dematerialized and phenomenal approach to the application of the pictorial effects of the architectural surface. The false windows of the façade in each of these three cases is unique.

Their function has been altered. The façade of the second floor above the entrance of Vergina palace (350 BCE) is devoid of any literal denotation; its purpose is to create a focal point indicating the penetrability of the main palace surface façade.

The surface/ façade of the other two tomb buildings in the Eurydice and Lefkadia were dissolved to symbolize the revelation of a new era; the new mask surface is a response to the power of newly emerging roof vaulting technology.

The treatment of the vaulted single storey interior behind the false windows of a two-storey façade at the Great Lefkadia tomb, is another clear evidence of the application of the surface façade in disregard to both the utilitarian function and structure of the space behind it.

5.1 Gottfried Semper's Concept of Dematerialization and Philip II Tomb Façade

Nearly five years after the attempt of the architect of Eurydice tomb to present a symbolic message by decorating the inner wall surface, the architect of the tomb of Philip II (**Fig.1, 2**) employed translucent/ semi-transparent effects to the Attica painting at the upper part of its façade to fashion its surface as a symbolic mask. This is an artistic final stage of this evolution where the surface engaged order became the prime characteristic of the Macedonian tombs (Haddad, 2015, 2018) [5].

The clearly defined structure and space, intended for the pre-planned function, were superseded at the *distyle in antis* façade and its engaged Doric semi-columns. The composition of the *distyle in antis* façade animated a distinct power to surprise its viewer. It does so through the unexpected incidents presented by the painting of the Attica wall in its frieze featuring the famous imagery of the hunt as shown in **Fig. 2b**(Andronicos, 1993, 101, Fig. 57).

The dissolution of space and content onto the surface marks the early phase of the Macedonian Hellenistic tomb architecture. The mask/ façade is not intended to be perceived as is physically but as a group of visual, intellectual and emotional effects.

The grand engaged Doric semi-columns *distyle in antis* façade of Philip II tomb could be a transposition or an allusion to the *Stoa*/portico that accommodated the rituals and ceremonies outside the temples at that time.

Its architect has denied the possibilities of potential uncertainty, by the absence of any stratification of the space either by real flat surface or by imaginary projections. Instead, the observer is offered a readymade image of the perspective at the flat surface that holds only one reading.

This tendency to emulate the *Stoa*/portico through two dimensional projection on the surface wall of the monumental entrance would undergo important developments during the Macedonian tomb architectural history (Haddad, 2013, 2018).

Effacing the volume in the Attica flat surface suggests nevertheless its presence by leading the eye to experience a series of larger and smaller frontal organizations and their synthesis within the whole **(Fig. 2b)**; the layering and stratification of the images and icons within the painting of the Attica façade wall, its multi-scale organization, and the tension between figure-ground relationships trigger multiple readings of the painting.

The flat surface of the picture phenomenally recedes to projects a sense of depth. Simultaneously, the viewer experiences an unusual overlap of space, surface, and event. (**Fig. 2**). It's clear that the intent of the architect of the tomb is to shift the attention from the mere constructing of images to producing powerful visual effects.

All the above examples demonstrate Semper's vesion of the origin of architecture which prioritized cladding as a dematerialization of the wall, thereby becomes a mask, for the sake of the anticipated visual, spiritual and intellectual effect. We can also argue that the experience of the façade of Philip II tomb

emphasizes elements that may deviate from Alberti's established conception of architecture.

The architect of Phillip II's tomb stressed the primacy of cladding over all other considerations in a way is also different from that of modern architects like Adolf Loos, who denied any dialogue between the tectonic (structure) and the a-tectonic (cladding). In the decorated façade of the tomb of Philip II, every detail whether in the shape, texture, or color is employed to attract the observer. Since the ornaments are related to detailing, they are an integral part of the tomb façade.

The facade underscores a pioneering approach; an extended and elaborate frieze crowned only by a cornice (Attica) replacing the classical triangular pediment of the typical Greek temple. The new style shows Attic influence, while in conception it displays and legitimizes the power of a probable Macedonian patronage. As a whole, the surface façade formation "suggests that integration of an Attic style and rural Macedonian taste is characterized by the landscape of estate"(Haddad, 2018, 14).

We can also detect the concern of the architect of Philip II tomb façade in the extent to which he redefined the relationship between building space and it surface i.e. the mask so as to express in the purest possible terms the deep symbolic content intended to affect the viewer.

At the core of his redefinition is the resolution of the inherent paradox of masking as both "concealing and revealing" because as Semper pointed out the materiality of the mask itself should be effaced so as not to deter the expression of the meaning and message behind it and distract the viewer from their perception. Semper declared that:

"the destruction of reality, of the material, is necessary if form to emerge as a meaningful symbol… The truly great masters in every field returned to it, except that in times of high artistic achievement these individuals also masked the material of the mask…"(Semper *,2004,* 438–9)[6].

More analytically, as an integral part of the framework of the façade tomb building, the painting of the Atticas flat surface was used to motivate the viewer to discover what lies behind; its information in the form, colour, texture, or other clues introduced throughout the façade such as the monumental functional doorway -the only marble element of the façade. The overall surface was treated as a unifying skin to accommodate the event, to wrap the space of the action with symbolic color clothing.

The flattened surfaces were stratified in a way that their depth would be only apparent through understanding visually and mentally the façade layers, and readings of the Attica painting.

Thus, the conception of surface and space is simultaneously established in the painted Attica panel and viewer's mind. The combination is also apparent in the use of material: a thin doorway shatters of marble contrasting with the repetitive mortar fabric of the facade mask.

The insertion of solid surface elements and the figures of the wall painting in the foreground emphasizes the transparency of the cladding to express the metaphoric qualities of the surface. The outcome redefined the connection between surface and structure in fundamental terms.

Thus, masking/ covering of the reality of vault construction at Philip II tomb, and revealing the illusion/ falsification of the façade mask are synchronized operations required to allow the symbolic content to emerge.

To conclude, early Hellenistic Macedonian tomb designs replaced the materialistic approach evident in classical architecture. They emphasized the phenomenal aspects of surface design by the means of masking the structure of the building in order to activate a lively state of communication of a symbolic content and a cultural interaction with it.

Here, architecture was presented to the viewer as a finished applied surface. It presented a way in which flatness of façade surface and depth of space can be reconciled.

6. THE TOMB'S FAÇADE SURFACE DESIGN WITH PEDIMENTED AND ENTABLATURED DOORWAY

As mentioned earlier, the second evolution phase of the Macedonian tomb (3rd to 2nd century BCE) is characterized by the application of new forms of pediments and entablatures as surface decorations as communication devices in association with the tomb central functional doorway.

Lyttleton had emphasized that the use of miniature classical orders of antiquity to ornament doors and windows may also be considered a-tectonic as it broke the rules of classical architecture (Lyttleton, 1974, 13).

In this phase (3rd to 2nd century BCE), the Macedonian tomb surface façade, its decoration/ornamentation signified the emerging historical, cultural, economic and symbolic values of the Macedonian Hellenistic society.

Evoking classical and Hellenistic architectural precedents, new iconographic ornamental motifs were developed in a more reductionist fashion. They were fused, flattened and applied on the only functional element of the façade i.e. the central doorway, as an emblematic and metaphoric vision of the everyday life and life after death (Haddad, 2013, 2018, 3).

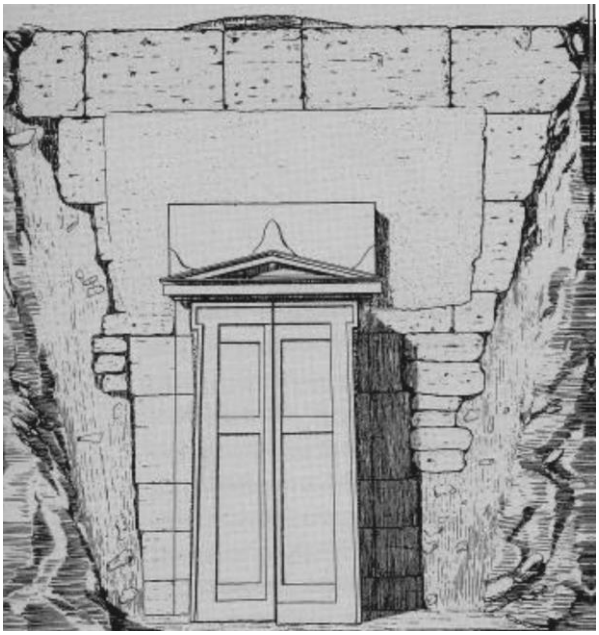

Figure 7. Façade of the Macedonian Tomb of Lyson and Kalliklis with a Pedimented Doorway at Lefkadia (After Miller, 1993, Fig.. 6).

They appeared in two configurations; the case of the pedimented doorway model (Macedonian tomb II of Kastri in Amphipolis, IV at Dion, tomb III of Bella Tumulus II at Palatitsia and of Lyson and Kalliklis in Lefkadia (**Fig. 7**) , or the case of the entablatured doorway model (for example the Macedonian tomb II of Neon Kerdyllion in Amphipolis, and Macedonian tomb of Haliakmon dam in Veroia (Fig 8).

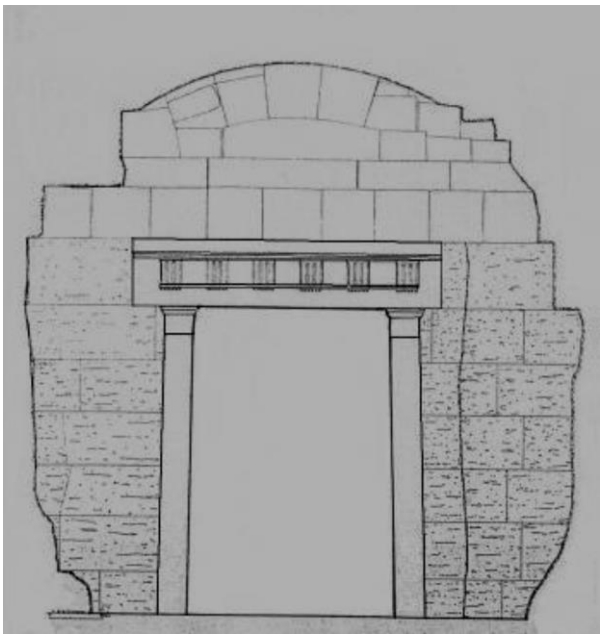

Figure 8. Façade of the Macedonian Tomb of Haliakmon Dam in Veroia (After Petsas, 1975, Plate 61)

It seems, as though, the reduction of the classical architecture as surface motif framing the doorway in these later examples of Hellenistic tombs mirrors Semper's vision of the "seam"; the essence of textile and consequently of architecture, as an elementary Human cultural symbol. In this later phase of its evolution, towards the end of the third and beginning of the second century BCE, the surface of the Macedonian tomb façade becomes more vivid metaphorically and spiritually.

Not only it conceals and covers the structure but now it also offers a comprehensive image that endeavors to absorb all the key features of the old monumental tomb façade /mask.

The doorway mask now signifies the whole building façade, to cover its direct reality in order to concentrate on the deep character and the symbolic content of the functional doorway and the tomb (Haddad, 1999; 2013; 2018). While the hidden vaulting construction technique is still the force of change, the starting point of the latter Hellenistic tomb design is the symbolism which empowers its façade to perform its role as an effect. A new Hellenistic symbolic style is thus a cross-breeding of architectural treatments, methods and techniques.

In this gradual movement, away from tectonic figuration to the a-tectonic transfiguration of the pedimented and entablatured doorway as surface mask, the physical connection between surface and space was denied to optimize a symbolic communication. As a mask, the pedimented and entablatured doorway is intended to be experienced by the eye the mind as an illusion in an enjoyable and pleasing manner.

Indeed, in its later evolution Hellenistic architecture has moved further away from the form-giving potentialities of construction, to the point that by the Middle of the Hellenistic era cladding has emerged as the formative mean. The new façade's configuration of those tombs becomes a model for the later rock-cut tombs and temples in Macedonia and other regions under the Macedonian influence, especially in Ptolemaic Alexandria and Nabataean Petra (Haddad, 1999; 2013; 2018, 20). Only by experiencing their interior space one can recognize the existence of its hidden vaulted roof or the rock-cut tomb space.

This might be considered as a direct shift towards treating the surface as a space of exchange; of human spiritual and intellectual interaction. Thus, one can suggest that by visually separating the interior from the exterior, the observer of the surface is pushed to experience the space within [7].

To conclude, the raison d'être of "ornaments" from the third to the beginning of the second century BCE, is not only just to please the vision; it is further to convey information about the nature and the rationale of the tomb building, the social and economic status and rank of its owners. Siwalatri et al (2012)

stated that architecture in classical times managed to use ornaments more than at any other time, "not only because the ornament is an aesthetic element, but rather for its symbolic role which holds an explanation, and for its role as a means of communication between the building and the users" (Siwalatri et al., 2012; Elrayies, 2018, 14).

As Haddad concluded (1999, 2013; 2018, 8), just as Modernism concentrated on the abstraction of form and diagrammatic analysis of function, so the Hellenistic Greco-Macedonian architects pursued abstract symbolic meaning through their play with the simple architectural elements of recognition such as the pediment, architraves, pilasters or semi-columns.

7. DISCUSSION AND CONCLUSION

To encourage architectural historians to develop a critical account of the formation of the Hellenistic tomb façade, this paper raises critical issues related to its surface design. The Macedonian tomb façade architecture is marked by a rejection of literal expression of function, the reality of materials and construction.

The Macedonian tomb is informed by dematerialization through masking the reality of its building so as to reveal the intended symbolic content. Thus, the issue of meaning in Hellenistic Macedonian tomb architecture is related to the manner with which its surface design is approached, rather than to functional considerations.

Hellenistic architects, we can argue, were able to present various interpretations of surface design since they were freed from the constructional and classical materialist limitations of design. However, they also conformed to structural rules and tectonic strictness to produce new formal and spatial effects at once.

The notion of dematerialization is not new. Over the long history of architecture, the issue of surface, mask, and ornaments had been questioned several times because it is embedded in the architectural expression.

The applicability of Semper's dematerialized approach to surface design should be extended to the Hellenistic tombs façade architecture. Hellenistic architects have caused a deep impact on architecture in terms of surface expressions. They were searching for new architectural symbolic effects that were no longer dependent upon the typical pre-existing styles/ orders.

The treatment of the façade of the Macedonian tomb expressed certain characteristics of dematerialization such as varying visual effects, diminishing the reality of some structural elements and materials all for the sake of the symbolic content. The evolution of the Macedonian tomb architecture inspired the architects of the Hellenistic and later eras to move beyond the oppositions of surface versus structure, inside versus outside, and form versus function, towards an active form of experimentation.

Hellenistic Macedonian artists and architects linked several important matters; culture, religion, history, society, aesthetics, and politics. They showed a clear shift in attitudes towards the surface ornament in architecture, which is now endorsed in our digital age.

The freedom of Hellenistic architects in defining conceptual façade design, when associated with the developments of the construction technology of vaulting provided continuous means of creativity and innovation to architectural façade design for the following periods. This technological development draws attention to new designs approaches.

The Hellenistic age provided the means for developing space and surface concurrently with new conceptions of theatre stage and vaulted roof technology. What the Macedonian tomb vault revolution offered was an opportunity to re-activate the essential role of building, as per the surface theory of Semper, as a cultural transmitter.

The ability of the tomb building surface to pass and transmit information through its mask façade is a major transformation associated with the Greco-Macedonian Hellenistic era. The Hellenistic surface design of the third to second century BCE should no more be considered as an object but an effect. It is evident that all other aspects of the Hellenistic architectural design such as materials, structure, construction methods and techniques on the one hand, and symbols on the other should be tackled from a phenomenal approach.Thus, ornaments in Hellenistic architecture go beyond decorating, to become further tools for expression and cultural reflection of the Oikoumene. The final result is an abstraction of the early grand tombs; a single doorway of the façade absorbing all elements and features of the façade /mask surface.

The first application of the surface triangular pedimented and entablatured doorway in Greek and Hellenistic architecture transformed it to a symbolic icon of the cultural and artistic Oikoumene identity. As an effect, the final stage of this evolution, dated from the end of the 3rd to the beginning of the 2nd Century BCE, led to an architecture flexible and resilient with meaning in par with the classical one of the golden age of the fifth and the late fourth century BCE.

Semper's theoretical approach may be considered as an inspiration for the development of this study. It may not be taken factually as an instruction for understanding Hellenistic architectural design. Rather it may elucidate conceptually the Hellenistic

architects' attention to the role that their designed surface played as opposed to its physicality. The characteristics of the pedimented and entablatured doorway were utilized to enhance the controversial nature of the mask as a tool of concealing and revealing at once, exerting a spiritual and intellectual effect on the viewer.

In this sense, the tomb façade as a mask should be clearly perceived as a means of expression and not as the end expression. Indeed, having been dematerialized, and manipulated in a way resulting in a phenomenal simplicity, the Macedonian tomb façade as a mask revealing distinct symbolic content, needs to be explored more.

It could be said that the way the surface ornament/decoration of Hellenistic architecture contributed to brand and image making in the globalization of the "Oikoumene Hellenistic Globalization" is analogous to the way contemporary architecture contributes to brand and image-making in the globalization of the Digital.

Contrary to Modernist architecture, the new techniques of construction of Hellenistic architecture, associated with the vaulting revolution, at the middle of the fourth century, have stepped -up aesthetic considerations in architecture.

This was demonstrated by the proto- baroque tendency of the Hellenistic Oikoumene within the larger Pan-Mediterranean context of the of the Greco-Macedonian, Ptolemaic Alexandrian, and Pompeian second style as well as the Nabataean architecture and even the Renaissance later. One can even argue that the Oikoumene Hellenistic impact have had on architectural design even today.

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FOOTNOTES

[1] According to Al Hassani (2004, 20), the objectification of the façade has focused the attention of modernist architects "on the image- quality of buildings". In this sense, by imposing on them a spirit of the age, functionalism disadvantaged these architects of freedom in cultural representation.

[2] Elrayies (2018, 24) reaches analogous outcome, in which she attributes the 21-century ornamentation rebirth to the technological progress, as "technology provides mass production of ornamented façade systems, and the advanced materials that allow various designs, flexible formation, and eco-friendly performance compared to the potentials of old plaster". In fact, the construction techniques' developments after the industrial revolution have opened for new tools/techniques for architects to carry the concept of dematerialization into concrete terms (Semper, 1989;Leatherbarrow, 1993; Al Hassani, 2004, 26). The return of ornaments/ decorations in contemporary architecture is also strongly attributed to advanced technology (Mitrache, 2012; Massey, 2013; Balik & Allmer, 2016; Elrayies, 2018, 14). Interesting enough, Schumacher (1987) considered Post-modernist façade as a mask, a cosmetic application on the surface.

[3] Indeed, the way Gottfried Semper's (1803–79) theory of cladding and its vision of dematerialization was associated with the development of construction techniques associated with the industrial and revolution" (Al Hassani, 2004, 21) is analogous to the dematerialization in Hellenistic tomb architecture which was associated with the development of barrel vaulted roof technology.

[4] A characteristic aspect of Semper's theory that distinguishes him from other thorists "stems from his awareness of the intellectual developments that were taken place in other disciplines like, for example, biology and philology" (Madrazo, 1995, 237).

[5] Just as an example of this rapid evolution, we are citing one tomb in the vicinity of Pella in Macedonia (as shown in Figure 1). The tomb is 10.30 m long, 6.70 m wide, 6.10 m high and it is dated to the end of 4th or the beginning of the 3rd century BCE (Chrysostomou 2003, 145).

[6] The ethics of masking according to Semper was also discussed by Leatherbarrow (1993), and Rykwert (1998).

[7] This is analogous to the case of Guggenheim Museum in Bilbao, Spain, 1997, by Frank Gehry, where "only by experiencing inside space one can experience the presence of the Museum roof " (Al Hassani, 2004, 79).

REFERENCES

Al Hassani, Jumana Mohamed, (2004), From Object to Effect: The Transformation of Cladding Conception in Architecture, Master thesis, University of Jordan.

Andronikos, M. (1987) Some reflections in the Macedonian tombs, *Annual of the British School at Athens* 82, 1987, pp.1–16.

Andronikos, M. (1989). *Vergina: the royal tombs and the ancient city*. Athens: Ekdotike Athenon S.A.

Andronikos, M. (1984). *Vergina: the royal tombs*. Athens.

Andronicos, M.(1993) Vergina*: The Royal Tombs and the Ancient City*, Ekdotike Athenon, Athens.

Annalisa di Roma,(2003),Ornament in Hellenistic architecture: Standardization in construction processes and the birth of the artistic industry. Hypotheses of updating, using CAD/CAM processes, Proceedings of the First International Congress on Construction History, Madrid, 20th-24th January 2003, ed. S. Huerta, Madrid: I. Juan de Herrera, SEdHC, ETSAM, A. E. Benvenuto, COAM, F. Dragados, 2003.

Balik, D. And Allmer, A. (2016). A critical review of ornament in contemporary architectural theory and practice. *ITUJFA, 18*, pp. 157–169.

Bothireddy, H. (2007). Syntactic and semantic role of ornament in architecture. Master thesis, University of Cincinnati.

Burn, L., (2004). *Hellenistic Art: From Alexander the Great to Augustus*, the British Museum Press. London.

Chrysostomou,P.(2003) The Macedonian Tombs. – In: Pella and its environs, Thessaloniki, 2003, pp.144–146.

Elrayies, Ghada Mohammad 2018, Architectural ornaments in the twenty-first century: An analytical study: In *Cities' Identity Through Architecture and Arts*, Catalani et al. (Eds), Taylor & Francis Group, London, pp. 9-25.

Frampton, Kenneth, (1995). *Studies in Tectonic Culture. Cambridge:*Cambridge University Press.

Haddad, N (1995) Doors and Windows in Hellenistic and Roman Greece, Dissertation Thesis, Aristotle University of Thessaloniki. (In Greek)

Haddad, N. (1999) Macedonia, Alexandria, Petra: Tomb Architecture, In International Congress, Alexander the Great: From Macedonia to the Oikoumene, Veria, 27–31. 5. 1998, Greece, pp. 161-171.

Haddad, N. (2013) Aspects of the Particularity and Creativity of the Nabataean Architectural Culture during the Late Hellenistic and Roman period, Proceedings of the First International Conference of the Nabataean Culture, Petra: 5 – 8, May 2012, In Studies on the Nabataean Culture I, Publication of the Deanship of Scientific Research, The University of Jordan- Amman, 2013, pp. 103-117.

Haddad, N. (2015), Critical Assessment of the Barrel Vault Geometry and Structure of the Oldest Macedonian tomb of Eurydice in Vergina, *Mediterranean Archaeology & Archaeometry*, Vol. 15, No.2. pp. 143-162.

Haddad, N. (2018). "The Macedonian Tomb Façade Formation and its Significant Role and Critical Stage for the Development of Hellenistic and Late Classical Façade Morphology", 16th annual international conference on history & archaeology: from ancient to modern, 2-5July 2018, Athens, Greece, Athens: Athens institute for education and research (Atiner's conference paper series, no: HIS2018-2561).

Herrmann, Wolfgang, (1989). *Gottfried Semper: In Search of Architecture*. Cambridge: The MIT Press.

Kottaridou, Angeliki, (1999) Macedonian Burial Customs and the Funeral of Alexander the Great, In International Congress, Alexander the Great: From Macedonia to the Oikoumene, Veria, 27–31. 5. 1998, Greece,pp. 113-121.

Leatherbarrow, David, (1993). *The Roots of Architectural Invention.* U.S.A: Cambridge University Press.

Lee-Niinioja Hee Soook, 2014, Toraja's Wood Carving: A Shared Social Heritage in Cultural Expression for Identity, *The South and Southeast Asia Culture and Religion (The SSEASR Journal),* Vol. VIII.

Leon Batista Alberti, (1988). *"On the Art of Building in Ten Books"* (1404-1472), translated by Rykwert et al.

Loos, Adolf, (1982). *Spoken into the Void: Collected Essays (1897-1900).*Translated by Jane O. Newman and John H. Smith. Vienna: Trotzden.

Lyttleton, M. (1974) *Baroque Architecture in Classical Antiquity*, London.

Madrazo, Leandro, 1995, The Concept of Type in Architecture: An Inquiry into the Nature of Architectural Form, Diss. ETH No. 11115, Swiss Federal Institute of Technology, Zürich.

Mallgrave, Harry Francis, (1996). *Gottfried Semper: Architect of The Nineteenth Century.* London: Yale University Press.

Massey, J. (2013). Ornament and decoration. In G. Brooker & L. Weinthal (Eds.), *The Handbook of Interior Architecture and Design. A&C Black.*

McKenzie, J. *The Architecture of Petra*, (Oxford: Oxford University Press, 1990).

Miller, S., G. (1993), *The Tomb of Lyson and Kalliklis: A painted Macedonian tomb.* Mainz: Mainz am Rhein.

Mitrache, A. (2012). Ornamental art and architectural decoration. *Procedia-Social and Behavioral Sciences*, *51*,pp. 567–572.

Mustafa, Bashar (2018) Funerary Architecture from Amrīt (Syria). New Mausoleum in Ard al-Bayada Cemetery. *SCIENTIFIC CULTURE*, Vol. 4, No 2, pp. 25-33.

Pakkanen, Jari, 2013, Classical Greek Architectural Design: A Quantitative Approach, *Papers and Monographs of the Finnish Institute at Athens* Vol. XVIII, Helsinki.

Petsas, P. M., (1966). *Ο τάφος των Λευκαδίων [The Tomb of Lefkadia],* Athens, (In Greek).

Petsas, P. M., (1975). Makedonika 15, Chronika, pp. 175-355 (In Greek).

Rykwert, Joseph, (1998). *Architecture is all on the Surface.* Fashion, Vol. 1:pp. 20 – 30.

Riisberg, V. & Munch, A. (2015). Decoration and durability: Ornaments and their 'appropriateness' from fashion and design to architecture. *Artifact*, Vol.3, Issue 3, pp. 5.1–5.13.

Siwalatri, N.K.A., Prijotomo, J. & Setijanti, P. (2012). Meaning of ornament in Balinese traditional architecture. *Journal of Basic and Applied Scientific Research*, pp.7121–7127.

Semper, G. (2004) *Style in the Technical and Tectonic Arts; or, Practical Aesthetics [1870–73*]. Translated by Harry Francis Mallgrave and Michael Robinson. Los Angeles, CA: Getty Research Institute 2004.

Semper, Gottfried, (1989). *Four Elements of Architecture and Other Writings*, Translated by Harry Malgrave, Massachusettes: Cambridge University Press.

Tomlinson, R.A.(1977) 'Vaulting Techniques of the Macedonian Tombs', In *Ancient Macedonia II*, Institute for Balkan Studies, Thessaloniki, pp. 473-479.

Tsimbidou-Avloniti,M., (2005) Macedonian tombs in Phoenix and Agios Athanasios Thessaloniki. *Contribution to the study of the iconography of the burial monuments of Macedonia*, Athens.pp. 89-171 (In Greek).

Tsimbidou - Avloniti, M. (1995) Agios Athanasios.*Archaeo Deltion (ΑΔ)* 50, Β2,pp. 472-474 (In Greek).

Winter, F., E. (2006) *Studies in Hellenistic Architecture*, University of Toronto Press. Toronto.