

Girih, Islimi and Epigraphy: a classification of the decorative systems of Central Asian architectural monuments

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Abstract: The decorative programmes of Central Asian architectural monuments constitute one of the most mathematically rigorous and artistically refined ornamental traditions in world art. This article systematises the types, definitions and classification of Central Asian architectural monument decoration on the basis of a comparative analysis of the foundational art-historical literature. A dual classification is substantiated: by motif, ornament divides into girih, islami and epigraphic systems; by technique and material, it divides into decorative brickwork, carved ganch, carved terracotta, glazed tilework, wood carving and wall painting, including the gilded kundal technique. The historical development of each type is traced from pre-Islamic carved stucco at Varakhsha through the classical flowering of girih in the tenth to twelfth centuries to the Timurid apogee of polychrome tilework and the later kundal tradition. The analysis demonstrates that all ornament, including free vegetal composition, rests on an underlying geometric grid and unfolds according to the structural sequence element-motif-scheme-composition. The regional differentiation of the tradition is characterised through the Khiva and Shahrisabz schools, and the symbolic stratum of the decorative system is disclosed.

Keywords: architectural ornament, girih, islami, epigraphy, ganch carving, glazed tilework, kundal, Central Asia, classification

Introduction

The architectural heritage of Central Asia - the monuments of Samarkand, Bukhara, Khiva and Shahrisabz - has long been recognised as a summit of ornamental art, distinguished by artistic perfection, compositional variety and a rigorous geometric foundation [1]. L.I.Rempel characterises architectural ornamentation as a historical unity of geometry, art and constructive thinking, and identifies the monuments of these four cities as exemplary models of pattern composition [1]. G.Necipoğlu likewise interprets the geometric patterns of Islamic architecture as a synthesis of mathematics, building technology and artistic thought, situating the Central Asian material within a broader civilisational context [2].

Despite the depth of the art-historical scholarship, a synthesising classification that reconciles the motif-based and technique-based taxonomies present in the

literature has not yet been formulated in a form operational for further scientific and applied use. S. S. Bulatov observes, in particular, that the methodology of transmitting the art of girih remains insufficiently elaborated and that the shortage of systematising literature has hindered the assimilation of this heritage [3].

The purpose of this article is therefore to systematise the types, definitions and classification of Central Asian architectural monument decoration on the basis of a comparative analysis of authoritative sources. The article addresses one central research question: how can the decorative systems of Central Asian architectural monuments be classified in a way that is faithful to the art-historical evidence, internally consistent and applicable beyond art history proper?

Materials and methods

The study employed a comparative-analytical review of the foundational literature on Central Asian architectural decoration. The corpus comprised classical monographs of the Soviet art-historical school [1; 4; 5; 6; 7], national Uzbek scholarship on applied decorative art [3; 8; 9; 10; 11], primary visual documentation such as the album of the Khiva master Abdulla Baltaev [12], regional architectural studies [13], methodological literature on pattern composition [14] and international scholarship on Islamic ornament [2; 15]. Studies of the symbolic semantics of ornament [16; 17] were included to capture the axiological layer of the material.

The sources were analysed along four dimensions:

- the definitions and terminology proposed for each decorative type;
- the classificatory criteria employed;
- the historical development and regional differentiation of each type;
- the compositional laws governing pattern formation.

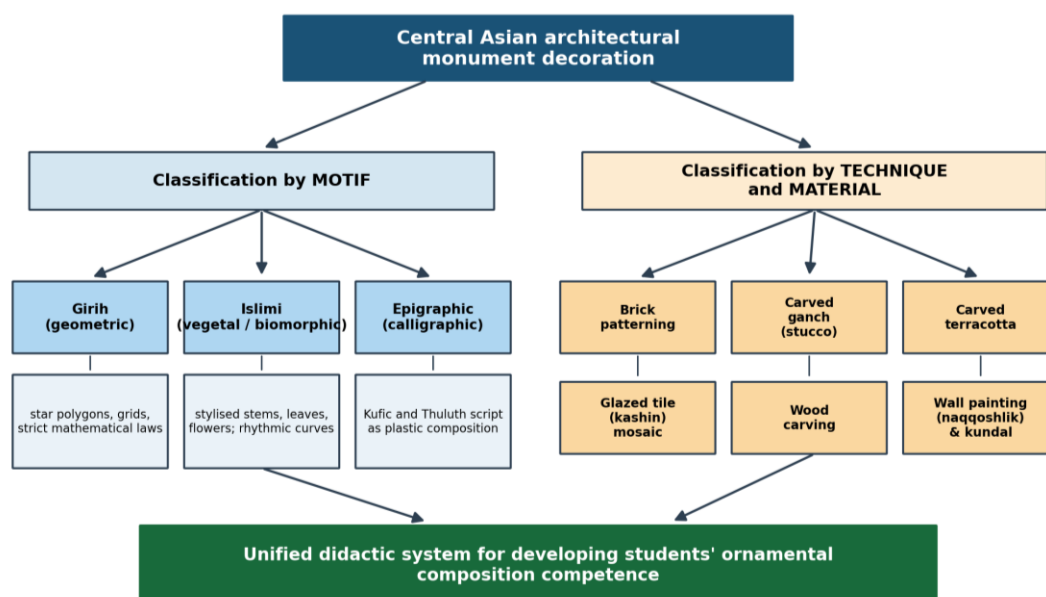
Convergences and divergences between authors were recorded, and a synthesising classification was constructed that reconciles the motif-based and technique-based taxonomies present in the literature.

Results

A dual classification of architectural decoration

The comparative analysis shows that the literature classifies Central Asian architectural decoration along two independent criteria (Figure 1). By motif, three great systems are distinguished: girih, the geometric ornament; islimi, the vegetal or biomorphic ornament; and epigraphic ornament based on the artistic styles of Arabic script [1; 4; 7; 10]. By technique and material of execution, the sources distinguish decorative brickwork, carved ganch, carved terracotta, glazed tilework (kashin), wood carving and wall painting, to which the gilded relief technique of kundal belongs [5; 9]. The two criteria are orthogonal: the same girih composition may be executed in brick, ganch, tile or wood, and most mature monuments combine several motifs and several techniques within a single decorative programme.

E. Alhamal offers a compatible international taxonomy of Islamic ornament into calligraphic, geometric, biomorphic and figurative types, noting that the geometric pattern constitutes the compositional foundation of the other decorative types [15]. B. V. Nigmonov and A. B. Ermatova reduce the field to the two principal motif families, geometric - girih and vegetal - islami, which they treat as the backbone of pattern composition [14]. The convergence of these taxonomies across scholarly traditions indicates that the dual classification is robust.



Sources: Rempel (1961); Denike (1939); M. Bulatov (1988); S. Bulatov (1991); Nilsen & Manakova (1974)

Figure 1. Dual classification of Central Asian architectural monument decoration by motif and by technique of execution.

Historical development

The historical trajectory of the decorative system is summarised in Figure 2. The earliest vegetal and carved-stucco decoration is documented in the pre-Islamic strata of Varakhsha and Mount Mugh, with excavated examples dated between the second and eighth centuries CE [4]. B.P.Denike identifies the Samanid Mausoleum in Bukhara, of the late ninth century, as the oldest mature example of geometric decoration in brick, in which the load-bearing bond of the wall is simultaneously its ornament [4]. The tenth to twelfth centuries constitute the classical period of girih [1], during which the ganch-carving schools of Samarkand, Bukhara, Termez and Fergana reached their height [5] and blue glaze entered wide use. Glazed tile decoration first appears in the twelfth century at the Mausoleum of Sultan Sanjar in Merv and the Kalyan Minaret in Bukhara, and attains its apogee in the fourteenth and fifteenth centuries under the Timurids, when cut-tile mosaic, polychrome glazed ceramics and relief tiles flourished, most completely in the architecture of Samarkand [4] and in the Aksaray palace of Shahrissabz [1; 13]. In the fifteenth century the gilded relief technique of kundal was formed, applied in the Ishratkhana, Aksaray, Tillakori and

Abdulazizkhan madrasah ensembles [9]; in the fifteenth to seventeenth centuries vegetal composition was enriched with bouquet and tree motifs [14], while after the seventeenth century the number of girih masters declined, Usta Shirin Muradov being recognised as a major late representative of the tradition [3].

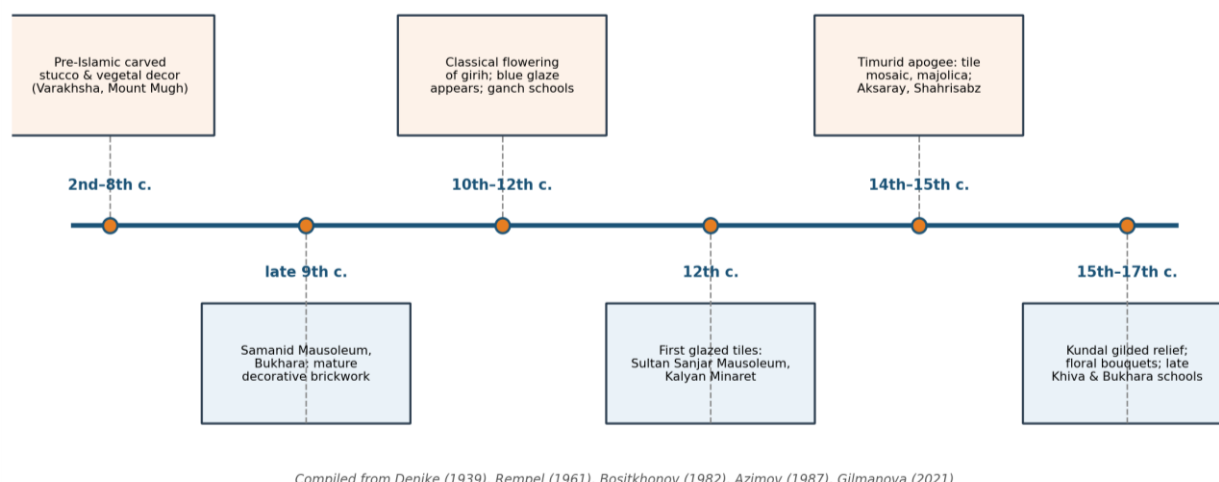


Figure 2. Historical development of the principal decorative types of Central Asian architecture (2nd-17th centuries CE).

Girih: the geometric system

The term girih derives from Persian and denotes a knot or interlacement; it names a strict geometric ornamental system [7]. Girih is constructed with the geometry of the circle, compass and ruler, and rests on the laws of symmetry and periodic repetition [1]. Structurally, girih compositions divide into border (band), network and rosette types [7]. Z.Bositkhonov defines girih as a unique pattern art governed by strict geometric rules: every girih is based on determinate geometric procedures, so that the master follows established laws, and its construction involves some forty geometric operations, from dividing the circle into equal parts to constructing regular polygons; six-, eight- and ten-pointed girih compositions constitute the principal constructive elements of ganch carving [8]. V.A.Nilsen and V.N.Manakova characterise girih as a geometric ornament grounded in mathematical law, whose polygonal and stellate compositions reinforce the tectonic structure of the building [6]. In the Sufi reading documented by E.F.Gyul, girih symbolises cosmic order, eternity and the human movement towards enlightenment, its interlaced knots and lines expressing the stages of spiritual perfection [16].

On the basis of the sources, girih may be defined as a complex system of geometric patterns formed by the harmonisation of stellate figures, polygons and geometric grids according to strict mathematical laws, ensuring the proportionality and geometric coherence of the composition and possessing an international character [8]. Its essential properties are geometric precision and mathematical proportionality; the

primacy of symmetry and rhythm; the periodic repetition of stellate and polygonal elements; and the guarantee of compositional integrity.

Islimi: the vegetal (biomorphic) system and stylisation

Islimi is a vegetal ornament created by the stylisation of plant forms - stems, leaves, flowers and buds - whose composition rests on the rhythmic and proportionate disposition of undulating stems, foliage and blossoms [1; 7]. Already in 1596 the treatise of Qazi Ahmad enumerated seven styles of decorative art with islimi among the principal types [1]. E. Alhamal designates this family internationally as the biomorphic pattern and records its terminological variety: nabati in Arabic, islimi and khatai in Persian, rumi, hatayi, yaprak and pench in Turkish, while regarding the term arabesque as a generalising and comparatively imprecise notion [15]. In the Bukhara school of wall painting, islimi differentiates into border patterns, vase and vessel images, stylised trees and shrubs, and freely composed floral patterns [1]; S. S. Bulatov records compositional varieties such as the quvacha, palak and cotton-boll islimi and notes its extensive use in the decoration of the Samanid Mausoleum [3].

Two findings of the comparative analysis deserve emphasis. First, the freedom of islimi is relative: every biomorphic pattern rests on an underlying geometric structure, its motifs disposed on a geometric grid with horizontal, vertical and occasionally diagonal symmetry [15]. Z.Bositkhonov expresses the complementary distinction: in girih the master submits to geometric rules, whereas in islimi the composition is created freely, and because islimi reflects the character of the local flora it possesses a geographic specificity [8]. Second, a single artistic method stands at the centre of pattern creation, namely stylisation. B.V.Nigmonov and A.B.Ermatova interpret stylisation as the artistic reworking of real forms [14]; S.S.Bulatov discloses the procedures by which natural forms are stylised [10]; and V.A.Lobov describes the staged transformation of the natural form into the decorative form [18]. In the course of stylisation the natural object is first drawn from nature; its most characteristic features are then isolated and secondary detail discarded; the form is geometrically simplified and subordinated to the laws of the plane; and finally the resulting motif is fitted into the rhythmic system of the pattern.

Epigraphic ornament, wall painting and kundal

Epigraphic decoration is the pattern type based on the artistic styles of Arabic script, manifesting the unity of writing and ornament in architectural composition [9]. In E.Alhamal's taxonomy the calligraphic pattern, as the artistic expression of the Qur'anic text, constitutes an independent type of Islamic decorative art [15]. E.F.Gyul observes that in epigraphic decoration the Kufic and Thuluth scripts merge with girih and islimi compositions, raising the text from a bearer of information to an autonomous plastic composition [16]; in Khorezm architecture, monumental epigraphic inscriptions

and girih compositions were harmonised on minarets, portals and domes by means of glazed brick and tile [12].

Wall painting (naqqoshlik) is the art of decorating walls, ceilings and wooden objects with polychrome patterns; in its historical development it passed from narrative imagery to ornamental composition, with girih and islimi as its principal compositional means, supplemented by the oygul and kungura motifs and by a symbolic colour code in which white signifies happiness and fortune, light blue elevated faith, and red joy [9]. The kundal technique, formed in the fifteenth century, applies gilding over relief pattern and was widely used in the decoration of the Ishratkhana, Aksaray, Tillakori and Abdulazizkhan madrasah [9]. S.S.Qayumov systematises the technological cycle of the craft - designing the pattern, preparing the perforated stencil (akhta or andoza), transferring it to the surface, painting and finishing - together with its traditional instruments, pigments, glues and varnishes, and differentiates the Tashkent, Bukhara, Samarkand, Fergana and Khiva schools of wall painting by colour range, compositional manner, pattern density and treatment of the ground, identifying the master-apprentice tradition as the principal factor of their development [11].

Techniques of execution: brick, ganch, terracotta and tile, wood

Decorative brickwork is the oldest of the executing techniques, producing geometric pattern on the wall surface through the varied laying of fired bricks in raised and recessed, oblique and vertical bonds. In the Samanid Mausoleum the brick bond itself performs the constructive and the decorative function simultaneously, a vivid confirmation of the thesis of the unity of geometry, art and constructive thinking [1]; brick decoration reached its height in the minaret and portal compositions of the eleventh and twelfth centuries and prepared the emergence of glazed brick and tile decoration [4].

Ganch, a local variety of gypsum plaster, supports one of the most ancient decorative techniques of the region: the carving of the still-unset ganch laid over the brick wall [4; 7]. S.S.Bulatov describes the material science of ganch - light, strong, resistant to humidity and temperature, divided into natural and artificial varieties and, by quality, into gul ganch, tez ganch and alabaster - whose softness permits patterns of extreme delicacy while its strength and elasticity suit seismic regions [3; 13]. He classifies ganch carving into flat-relief finishes (qirma, choka, pax, lula, tabaqa, chizma and zanjira) and volumetric forms (muqarnas, sharafa and dome-like elements), records that in the qirma finish the carved recesses are filled with coloured paste, that choka is among the most ancient finishes attested at Varakhsha and Afrosiab, and that the tabaqa finish spread from the nineteenth century, flourishing in the work of Usta Shirin Muradov [3]. L.I.Rempel documents the perfection of the zamin-kori, pax and choka finishes between the eleventh and fifteenth centuries [1]; V.A.Nilsen and

V.N.Manakova emphasise the light-and-shadow contrast of relief ganch in muqarnas, lattice and interior compositions [6].

Carved terracotta - decoration carved or moulded in fired clay slabs - is treated by B.P.Denike as an independent decorative type whose subsequent glazing constituted a formative stage of tilework [4]. Glazed tile decoration (koshinkorlik) is the art of revetting architectural structures with glazed ceramic tiles; V.A.Nilsen and V.N.Manakova define it as a polychrome architectural revetment art comprising glazed terracotta, majolica and cut-tile mosaic, dominated by turquoise, deep blue, white and gold, which attained its highest development in the Timurid period [6]. E.F.Gyul interprets the turquoise, lapis and white of the tiles as symbols of the sky, purity and divine light, the play of light on the glazed surface expressing the Sufi idea of tajalli, divine self-disclosure [16].

Wood carving decorates the constructive elements of the building - doors, gates, columns, beams, lattices and ceiling members - with girih and islimi patterns cut at varying relief depths, chiefly in walnut, plane, elm and juniper. B.P.Denike dates its earliest examples to the end of the first millennium CE and cites the columns of Kurut, Oburdon and the Juma Mosque of Khiva as its summits [4]. In the vernacular tradition the capital zone of the column is decorated with madohil motifs and the shaft with islimi and girih; doors and lattices are assembled without glue by traditional tongue-and-groove joinery; and the preservation of the natural texture and colour of the wood is an essential artistic property of the type [6].

Regional schools: Khiva and Shahrisabz

The regional differentiation of the tradition is well documented for the Khiva (Khorezm) school in the album of the master Abdulla Baltaev [12]. Khiva girih is built on strict geometric calculation with compositions organised by the repeat unit and adjusted to the volume and proportions of the building; Khiva islimi consists of small, dense and intricate vegetal elements stylising the local flora; and Khiva majolica and tilework are marked by the dominance of white, light blue and turquoise, uniting girih, islimi and epigraphic composition on the glazed surface. The wood carving of the school, above all in the columns, doors and gates of the Juma Mosque, unites deep-relief islimi, scroll patterns and script elements in a single composition [12].

The Shahrisabz school occupies a special place in the tradition. N.Gilmanova analyses the architectural-decorative system of the Timurid and post-Timurid ensembles of Shahrisabz - Aksaray, Dorut-Tilovat and Dorus-Saodat - in which girih, islimi and epigraphic compositions are harmonised with the techniques of tilework, ganch carving and decorative brick [13]. L.I.Rempel counts the Aksaray portals among the most mature examples of cut-tile mosaic and places the Shahrisabz monuments beside those of Samarkand, Bukhara and Khiva as perfect models of pattern

composition [1], while I. M. Azimov records the use of the kundal technique in the Aksaray decoration [9].

The symbolic and philosophical layer

Beyond its artistic-technological content, the decorative system carries a deep symbolic stratum. In E.F.Gyul's interpretation, girih is a geometric system signifying cosmic order and eternity; islimi is the symbolic image of the paradise gardens described in the Qur'an, the unbroken movement of stem, leaf, bud and flower expressing divine blessing and the continuity of life; and the turquoise and lapis of the tilework symbolise the sky, purity and divine light [16; 17]. I.M.Azimov discloses the symbolism of the oygul and kungura motifs - happiness and prosperity, and the idea of protection, respectively - and of the colour code of wall painting [9]. This semantic layer establishes ornament as the materialised worldview of a people, not merely a formal system.

Conclusion

The comparative analysis of the foundational literature yields a robust dual classification of Central Asian architectural monument decoration: by motif into girih, islimi and epigraphic systems, and by technique into decorative brickwork, carved ganch, carved terracotta, glazed tilework, wood carving and wall painting with kundal. The historical development of each type was traced from the pre-Islamic strata of Varakhsha to the Timurid apogee and the later kundal tradition; the definition of each type was consolidated and its compositional laws described. The analysis established the interdependence of girih and islimi - the construction of even the free vegetal pattern on a geometric grid - and identified stylisation as the single artistic method standing at the centre of pattern creation. The regional differentiation of the tradition was characterised through the Khiva and Shahrisabz schools, and the symbolic stratum of the decorative system was disclosed. The classification substantiated here, together with the structural sequence element-motif-scheme-composition [1], provides an art-historical foundation for further applied research, including the pedagogical assimilation of this heritage, which the author examines in a companion study.

References

1. Rempel L.I. Architectural ornament of Uzbekistan: History of development and theory of construction / Ed. by G.A. Pugachenkova. – Tashkent: State Publishing House of Artistic Literature of the Uzbek SSR, 1961.
2. Necipoğlu G. The Topkapı scroll: Geometry and ornament in Islamic architecture. – Santa Monica: Getty Center for the History of Art and the Humanities, 1995.
3. Bulatov S.S. Ganch carving (Ganchkorlik). – Tashkent, 1966.

4. Denike B.P. Architectural ornament of Central Asia. – Moscow–Leningrad: Publishing House of the All-Union Academy of Architecture, 1939.
5. Carving and painting on ganch and wood / Ed. by L.I. Rempel. – Tashkent: Publishing House of the Academy of Sciences of the Uzbek SSR, 1962.
6. Nilsen V.A., Manakova V.N. Architectural decor of Central Asia. – Tashkent: Gafur Gulyam Literature and Art Publishing House, 1974.
7. Bulatov M.S. Geometric harmonization in the architecture of Central Asia, 9th–15th centuries: A historical-theoretical study. – 2nd ed. – Moscow: Nauka, 1988.
8. Bositkhonov Z. The art of the ganch carver: The work of Mahmud Usmanov. – Tashkent: Gafur Gulyam Literature and Art Publishing House, 1982.
9. Azimov I.M. Decorative painting of Uzbekistan. – Tashkent: Gafur Gulyam Literature and Art Publishing House, 1987.
10. Bulatov S.S. Uzbek folk applied decorative art. – Tashkent: Mehnat, 1991.
11. Qayumov S.S. Applied decorative art: Textbook for higher education institutions. – Bukhara: Bukhara State University Press, 2021.
12. Khiva ornament in the collection of the folk master Abdulla Baltaev: Album / Comp. by A. Baltaev. – Tashkent: State Publishing House of Artistic Literature of the Uzbek SSR, 1957.
13. Gilmanova N. The architecture of Shahrisabz: The Timurid and Baburid periods: Monograph. – Tashkent, 2021.
14. Nigmonov B.V., Ermatova A.B. Naqshi nigoralar: Composition in decorative painting: Methodological manual. – Tashkent: Nizami Tashkent State Pedagogical University, 2010.
15. Alhamal E. Islamic biomorphic patterns: Creating motifs inspired by the natural world. – London: Herbert Press, 2025.
16. Gyul E.F. Sufism and the art of ornament // San'at. – 2000. – No. 3. – P. 12–15.
17. Gyul E.F. Heavenly gardens and earthly gardens. The embroidery of Uzbekistan: The hidden meaning of ornaments. – Moscow: Mardjani Foundation, 2013.
18. Lobov V.A. Stages of teaching future artists of traditional applied art the transformation of the academic sculptural form into the decorative form – 2019. – P. 117–128.