

SYMMETRY ANALYSIS OF NEOLITHIC PAINTED POTTERY FROM THE REPUBLIC OF MACEDONIA

1. INTRODUCTION

Neolithic pottery from Southeast Europe and Anatolia is well known for its remarkable and specific decoration. Very often the visual features of these objects are used for determining the relative chronology of the excavated sites, without considering their potential for mathematical observation. The repertoire of patterns used for developing the compositions painted on the vessels provides abundant data for such analysis. Almost all of the fragments discovered so far as well as the completely preserved painted pots from these regions were decorated following several visual principles, in order to create a precise disposition of the patterns onto the spherical surface of the vessel. This decorative approach was used in all the standards of Neolithic geometry, employing both symmetry and principles of visual entropy.

The painted vessels from Early and Middle Neolithic settlements discovered in the Republic of Macedonia, for example, provide a variety of information about the organization and structures incorporated on the decorated pottery. In the earlier phases, these painted compositions were mostly based on principles of the Four Rigid Motions of pattern disposition on one-dimensional format, while later, besides using this concept, the principle of antisymmetry was implemented in order to compose a two-dimensional image.

This paper aims to detect all possible forms of plane symmetry, patterns and compositions applied in the decoration of Neolithic vessels from Macedonia, as well as to promote the study of geometric symmetry as a possibility for the reconstruction of decorated fragments. Consequently, methods of mathematical observation will be proposed as a means for detailed examination of the vessel's visual potential and will be further implemented in tracing the elements of visual identities of communities inhabiting the Neolithic Balkans.

2. NEOLITHIC IN THE REPUBLIC OF MACEDONIA

The beginning of the Neolithic in Macedonia has been dated to the second half of the seventh millennium BC (Fig. 1). The process of Neolithization started rapidly after the first wave in the Balkan Peninsula and introduced domestication, economy, architecture and new rituals and social relations among communities. Newly established communities mainly spread across the plains, close to rivers where they built their dwellings made of wattle and daub. The abundance of vegetation and animals insured a steady development

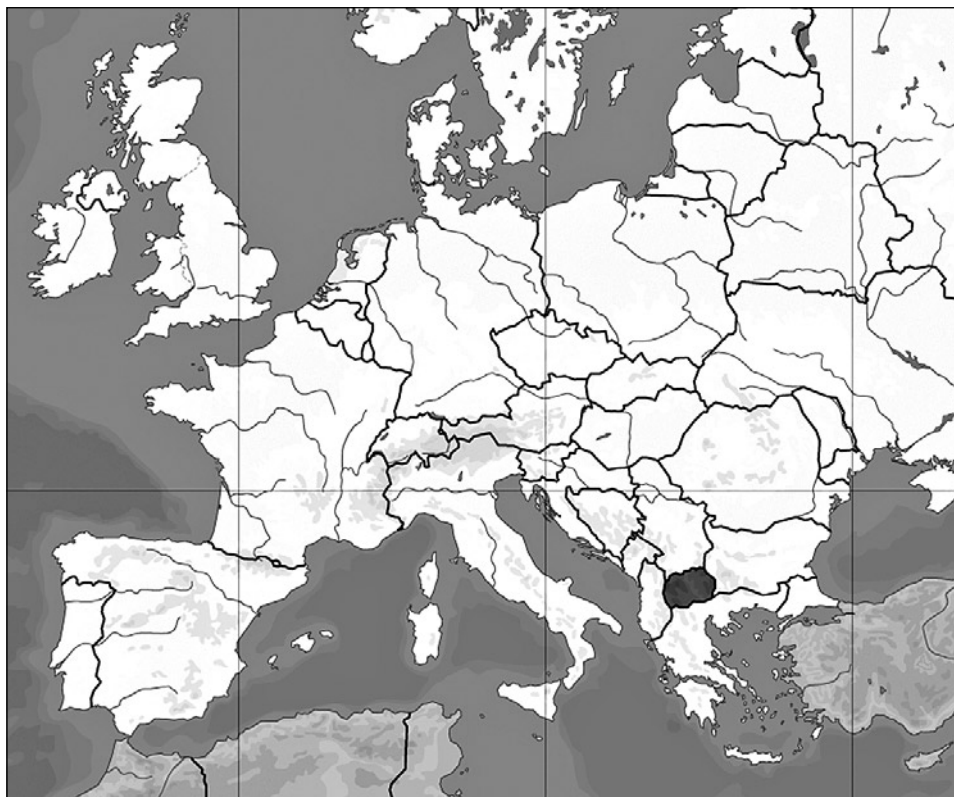


Fig. 1 – Position of the Republic of Macedonia in Europe.

of the settlements and increased economic cohesion with those in the surrounding area, as well as to those located far from the region. The importation of “exotic” materials in the settlements occurs in the course of this process.

Newly established cultures were settling different regions and generating local identities, thus creating regional features, which later would be easily recognized by archaeologists. In this way, they confirmed the existence of several Neolithic cultural groups, which were dispersed within geographically authentic and isolated areas (plains, lakes, rivers, etc.), but also emerging in different periods. According to tradition, among the Early Neolithic cultural groups, those of Amzabegovo-Vršnik, Velušina-Porodin and Zlastrana groups have been identified: the first one is located in the Ovče Pole plain, the second in the Pelagonian plain, while the third was in the territory of the Ohrid region (GARAŠANIN 1979; SANEV 2004). During the Middle Neolithic in the Pelagonian plain a new Trn cultural group emerged, whilst Velušina-Porodin

and Amzabegovo-Vršnik entered into their second phases. In the Late Neolithic the territory held by the Amzabegovo-Vršnik group demonstrated new cultural manifestations to the Angelci-Zelenikovo group, whereas in the Ohrid region a distinct Ustie na Drim group has been confirmed (BENAC 1979; GARAŠANIN 1979; BENAC 1989; SANEV 1995).

All of these cultures displayed their own features in their pottery production, but also shared similarities along with other groups, mainly on the level of architecture, economy and religion, thus including similar stone and bone tools, figurines, “altars”, ornaments, as well as dwellings (with the exception of those in Ustie na Drim which are palafitte or stilt houses). As for the vessels, along with the “Neolithic package” pottery production was also established, which enabled the development of a variety of vessels, as well as a wide range of techniques for their manufacture and decoration. Most of the vessels were made of coarse clay, and mainly used for storing raw goods and liquids, but they also made vessels for the preparation of food, which included pots, jars, plates, askoi and lids (FIDANOSKI 2009). Those vessels belonging to the category of fine pottery show a different approach towards modeling and conceptualization. Due to their polished surface and fine fabric, these vessels were not intended for cooking, thus allowing more concentration on their appearance and decoration. Most of these vessels include cups and amphora-like pots. Painting with white, black or brown pigments on the red polished surface was the preferred technique for their decoration. The creative approach towards the styles of patterns applied to these vessels resulted in the visual identification of the community’s identity with the visual principles implemented on the decorated pottery.

3. SYMMETRY AND ITS IMPLICATIONS IN NEOLITHIC DESIGN

The most remarkable and representative attribute of the Neolithic painted vessels is their firm and structured decoration. These vessels represent the earliest attempts to employ this type of decoration found in the territory of the present the Republic of Macedonia. The globular shape of the vessel itself facilitated this kind of organized decorative visualisation, and the cyclical movement and intertwining of the forms. The organised placement of patterns, incorporated in the compositions placed in symmetry with each other, demonstrates that the Neolithic communities maintained rational and logically developed perception of space. The potters attempted to establish all possible symmetrical principles, to depict them and to create visually reminiscent compositions. The visual approach, in which a composition is transposed onto the surface of the vessel, suggests another innovation introduced in the Neolithic era. Namely, it refers to firmly defined principles of arranged imagery forms, which were established and repeated over several

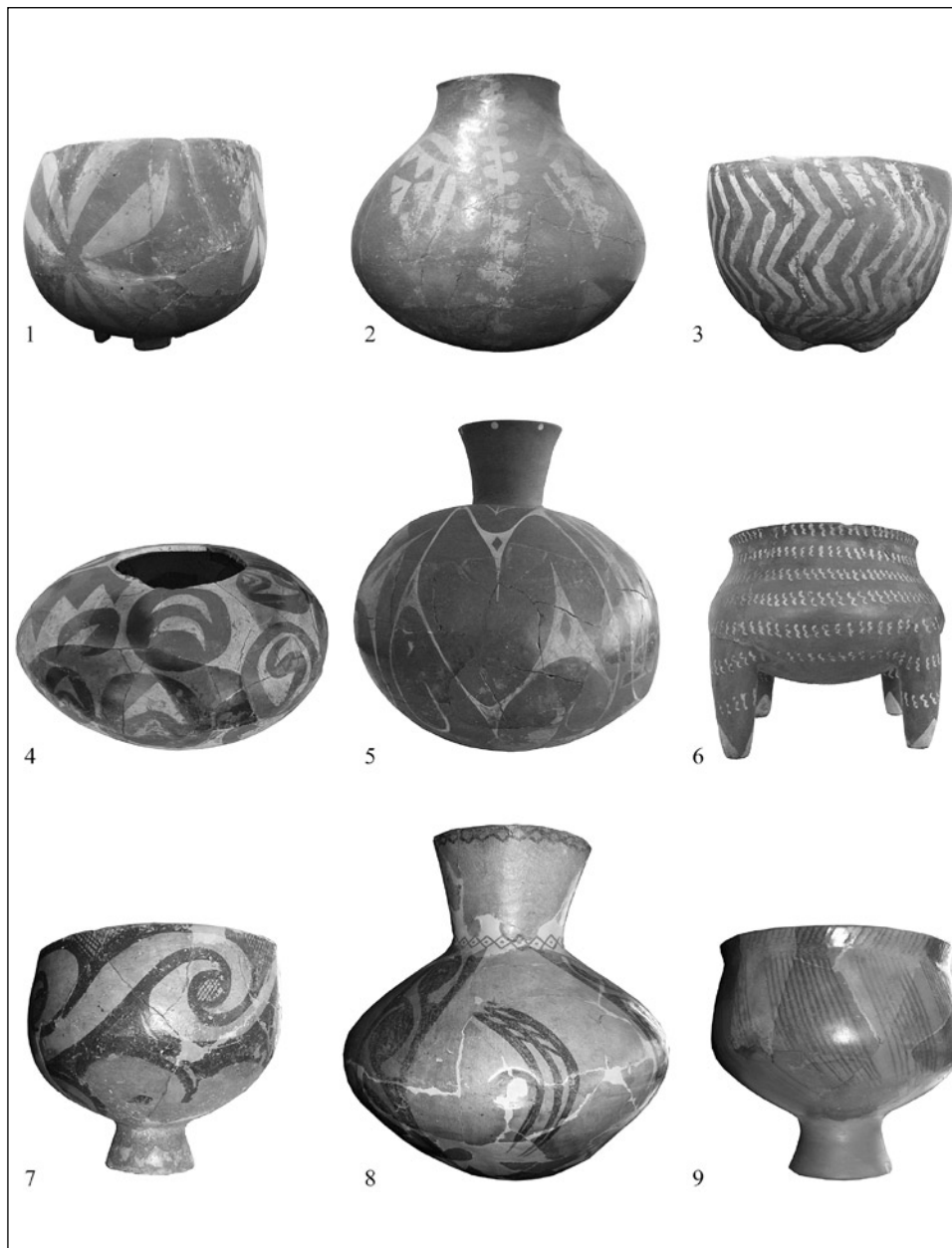


Fig. 2 – Early and Middle Neolithic painted pottery from the Republic of Macedonia. 1-3: Amzabegovo; 4-6: Veluška Tumba; 7-9: Madjari (photos by G. Naumov).

generations. This suggests the existence of a Neolithic design, represented by established combinations of patterns which, on the one hand corresponded to the imagined idea or concept, but on the other, also represented the visual entity through which a cultural group identified itself (Fig. 2).

In various periods and regions there have been communities where imagery rather than the written “language” was used as the major means of communication. Diverse imagery forms, both representational and nonrepresentational, embodied visually projected ideas fundamental to the crucial concepts of those cultures. These ideas were usually visualized through exact principles conceived along the lines of concrete geometric accuracy. In this sense, the basic mathematical values might be concerned and used in understanding these regularities. This provides the profound depiction of patterns in its most elementary level and consequently the elaboration of its features defined by a certain model. Symmetry analysis enables us to determine the regularities within the visual structure of a repeated pattern, which was used in various aspects of developing compositional structure or certain exact imagery forms. As today, symmetry was also identified in the past as a vastly effective principle for structuring visual and social relationships among the cultural groups and their essential imagery forms. Considering that these relationships were based among illiterate populations, they were metaphorically embedded through proper symmetrical standards that structure patterns created onto visible surfaces of many forms of material culture (WASHBURN, CROWE 2004).

Analyses of the patterns morphology and structure demonstrate that they are executed very accurately, thus following a scheme determined beforehand and used in the positioning of the patterns in a symmetrical ratio. Symmetry was used as a fundamental principle which places the patterns in organized compositions, establishing the concept of eurhythmy, i.e. the harmony of the parts into one entirety. In spite of the fact that some authors consider that these patterns and their arrangement are of entoptic origin (LEWIS-WILLIAMS, PEARCE 2005, 120-122; BUDJA 2004, 62), the geometrical flexibility of these patterns should be considered, as well as their capability to be mathematically arranged on one surface, i.e. composition (NAUMOV 2005, 71; NAUMOV 2009a). The linear structures that build the composition are often referred to as modules, where the symmetrical arrangement of the composition is constructed by their permutation and transposing.

These principles of modularity, generative grammar, symmetry and asymmetry have been analyzed by several authors who stress the mathematical approach towards pottery decoration (HAGSTRUM 1985; JABLAN 1989; JABLAN 1995; WASHBURN 1999; HODER 2003, 61-74). Consequently, a Euclidean geometry was employed, thus providing the structure of patterns (designs composed of regularly repeated elements). This way, compositions

are developed by the symmetries, i.e. rigid motions that generate the patterns due to four elementary constructive movements: translation, rotation, mirror reflection and glide reflection (WASHBURN 1999, 549). This geometrical approach implies that a Neolithic community developed a strict psychological definition of space and its organization. The mental potential for defining organized visual structures onto pottery was also reflected and intertwined with the other elements of social life: settlement and habitat organization, definition of the hierarchical system, exchange of goods, as well as with the elements of religious practice and symbolic communication.

Symmetry is one of the most crucial principles in the formation of design practiced worldwide. Success of the theory of groups of symmetry in crystallography, which proposes the use of discrete groups of isometries of the Euclidean plane in the study of the planar patterns, influenced mathematicians analyzing the Moorish decorations in the Alhambra as well as the study of the Southwest American Indian pottery. This meant that exact mathematical methods were used in order to be applied to ethnographic and anthropological research (GRÜNBAUM 2004). The study of classification and analysis of patterns based on symmetries was enriched by the contributions of different authors (SHEPARD 1948; BELOV 1956; WASHBURN 1977; CROWE 1986; JABLAN 1995; GERDES 2002; GRÜNBAUM, SHEPARD 2002; DAUGHERTY 2004; FRAME 2004; ROE 2004). Instead of analogies, these authors used a more precise geometric-crystallographic terminology and the theory of symmetry, which thus became potent means for researching pattern principles. Gradually, symmetry analysis of patterns was developed as a consistent method, used mainly to study ancient decorative arts or that of tribal populations (JABLAN 1995, 4).

According to D.K. WASHBURN (1977, 12, 13, 23): «the definition of symmetry focuses upon the symmetrical figure as an end product of a series of motions across a plane or about a point. In this perspective, a symmetry operation can be defined as a process by which the basic asymmetric parts of a figure pass through specified motions on specified axial loci until they reach identity with themselves or superposition with the next figure». All symmetrical patterns are based upon one or more of the following four motions:

- Translation: involves the simple movement of fundamental part or parts along the line axis.
- Reflection: requires the fundamental parts to be reflected across line axis in a mirror image relationship.
- Rotation: requires the fundamental parts to be moved about a point axis. They can change orientation any number of N-fold times within 360 degrees arc.
- Glide reflection: combines motions or mirror reflections across a line followed by translation along that axis into the succeeding position. This motion produces a figure that resembles the alternating left-right movement involved in human locomotion.

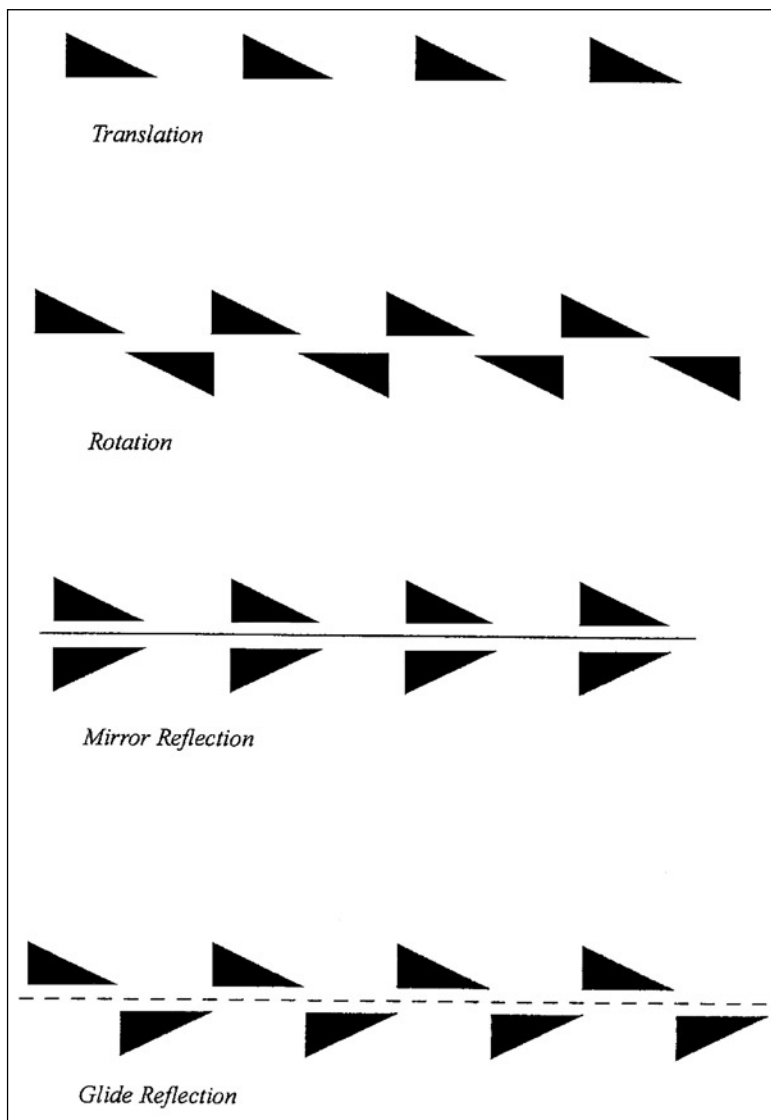


Fig. 3 – The Four Rigid Motions in the Plane: translation, rotation, mirror reflection and glide reflection (after WASHBURN 1999, fig. 1).

Symmetry operations producing both single color and two color design units result in three major design categories for plane pattern designs: finite, one dimensional and two-dimensional (Fig. 3). Finite patterns are single figures

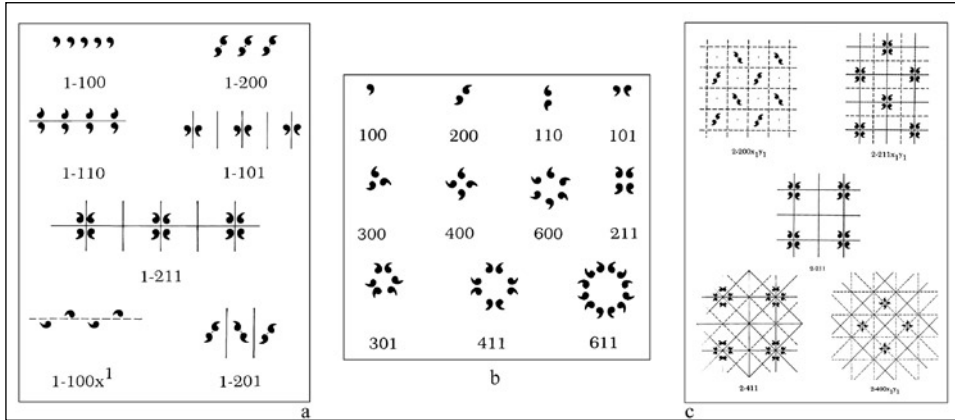


Fig. 4 – Illustrations of a) classes of the one-dimensional design; b) most common forms of pure finite design; c) generation of two-dimensional infinite patterns (after WASHBURN 1977, figs. 16, 18, 24, 27, 30, 34, 35).

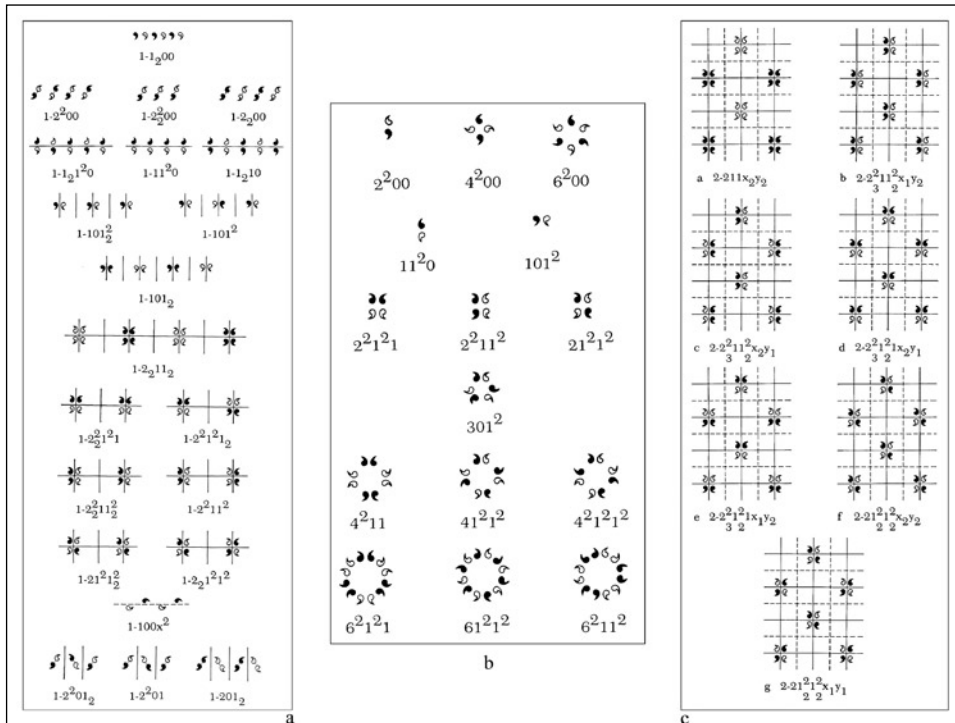


Fig. 5 – Illustrations of a) 21 counterchanged classes of one-dimensional design; b) most common forms of counterchanged finite designs; c) two-dimensional counterchanged design (after WASHBURN 1977, figs. 17, 19, 55).

generated around a single point axis through which line reflection axes may or may not pass. One-dimensional are generated along a single midline axis. Two-dimensional patterns are generated along both horizontal and vertical axes (Fig. 4). Finite designs can possess only the motions of reflection and rotation, whereas those that are one- and two- dimensional can be generated by all four of the basic motions: translation, reflection, rotation and glide reflection. The majority of pure finite classes, as well as one- and two-dimensional designs have corresponding counterchanged forms (Fig. 5).

In his work, D. CROWE (2004, 9) asserts that «...each of the four rigid motions may be present, or absent, in given 1 or 2 dimensional pattern. Often the four-symbol notation is given, so that the presence of certain movements is emphasized. Thus, the first symbol is *p* – signaling the existence of translation. The second is *m* – used wherever there is vertical reflection and *l* otherwise. The third symbol is also *m* – if there is a horizontal reflection, than *a* – if there is glide reflection and *l* otherwise. The fourth symbol is *2* – if there is a half turn and *l* otherwise».

4. PATTERNS WITHIN THE PAINTED POTTERY IN THE REPUBLIC OF MACEDONIA

As has been emphasized by other researchers, painted pottery in Macedonia can be classified into two cultural groups (GARAŠANIN 1979; SANEV 1995): Amzabegovo-Vršnik (consisting of Ovče Pole, Polog and Skopje regions) and Velušina-Porodin (Pelagonia and Ohrid regions), although some of the patterns are found in both regions of Ovče Pole and Pelagonia (Fig. 6). As for the earlier phases of the Amzabegovo-Vršnik group (Fig. 2, 1-3; Fig. 7), most of the patterns consisted of stair-like triangles, inclined stripes with triangles, netted stripes and doubled triangles, dots placed beside or on the line, zigzag lines, bent and vertical lines, angled lines positioned vertically or oppositely with the peaks to the front. Due to the fragmentary state of the pottery, only a few complete Early Neolithic compositional structures can be determined including compositions constructed of zigzag lines where one zigzag line was used as a pattern which is replicated all over the body of the pot (Fig. 7, 1).

Other compositions of this cultural group were created by using the horizontal arrangement of patterns where one of the patterns, consisting of a vertical stripe of angled lines, essentially serves as a frame in order to create two larger areas in which the central pattern is positioned, and duplicated or modified on the other side of the pot as well (Fig. 7, 2-3). Rarely, vertical belt arrangement is present, although this manner of arranging the patterns is common for the Middle Neolithic of the Amzabegovo-Vršnik group (NAUMOV 2005; NAUMOV 2009a, 123-125). These compositions consisted of two belts with different patterns in each, mostly including triangles in the upper first belt, while in the larger belt below netted angled stripes or vertical lines are positioned (Fig. 7, 6-7).

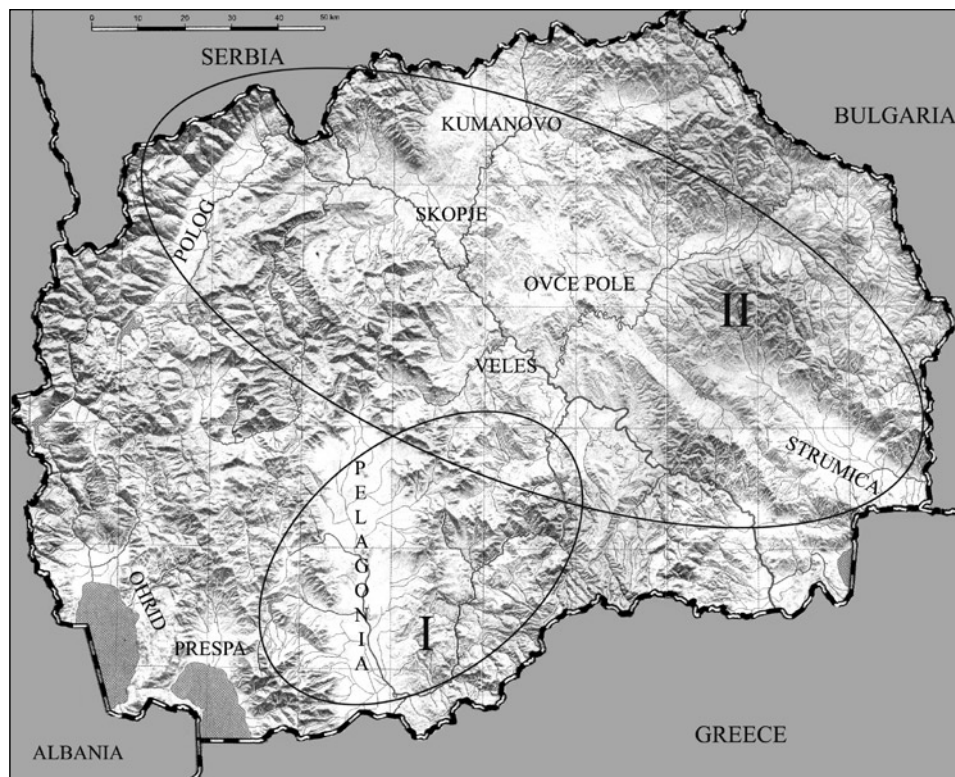


Fig. 6 – Regional cultural groups developed in Middle Neolithic. I: Velušina-Porodin; II: Amzabegovo-Vršnik.

In Pelagonia, a major part of the Velušina-Porodin cultural group, white painted pottery is present in both Early and Middle Neolithic with patterns mostly shaped as: triangles with lozenges, stair-like triangles and lines, stretched triangles, C and 3 patterns, lozenges in negative, multiple crosses, as well as the so called “drops” (Fig. 2, 4-6). Within compositions, the belt division is rarely present and is only used for the spatial organization of patterns in groups. A vertical arrangement of patterns is most often employed by multiple horizontal stripes of one pattern, vertically positioned all over the vessel, or only on the rim, the end of the neck and around the handles. Despite this approach, there is much more precise positioning of patterns in the more complex and apparently abstract compositions. These compound large patterns are actually duplicated on the other side of the vessel thus creating entities on the whole surface (Fig. 2, 5 and Fig. 8).

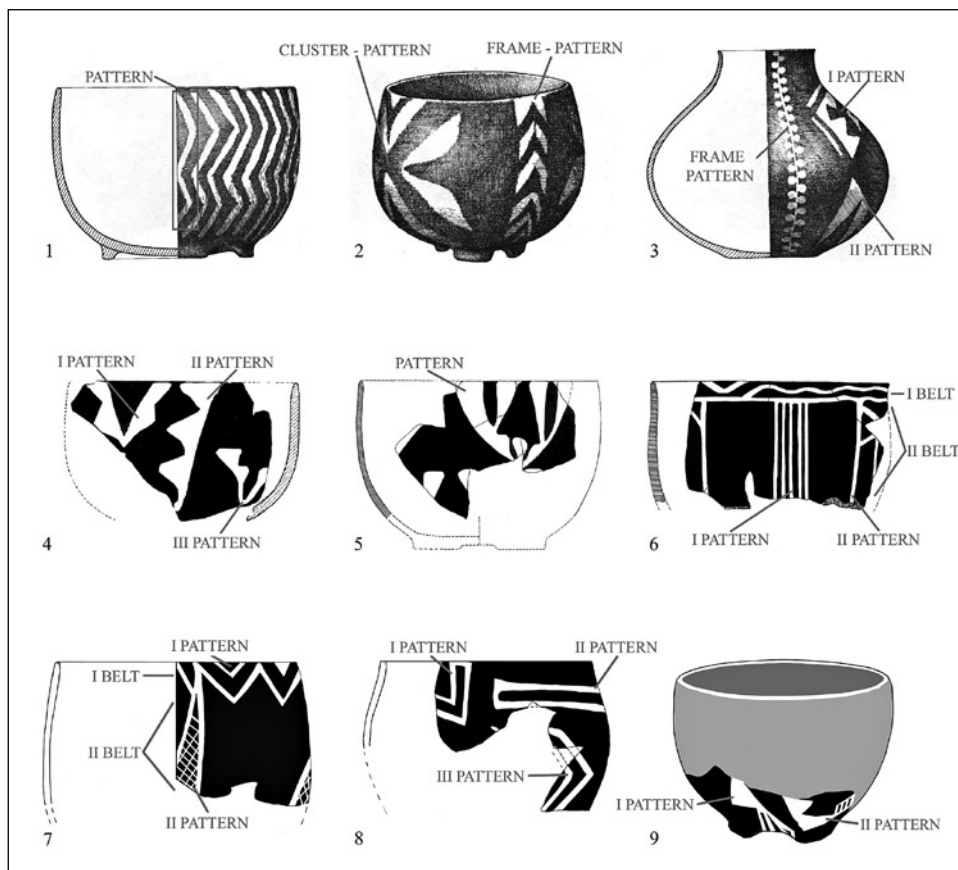


Fig. 7 – The compositional principles on the white painted vessels. 1-6: Amzabegovo (after GARAŠANIN 1979, T. XIII: 1, 3, 6; Tasić 2006, figs. 3, 8; KOROŠEĆ 1971, 135, fig. 1); 7, 8: Govrlevo (drawing by G. Naumov); 9: Nemanjica (drawing by G. Naumov).



Fig. 8 – Reconstruction of white painted composition from Veluška Tumba (drawing by G. Naumov).

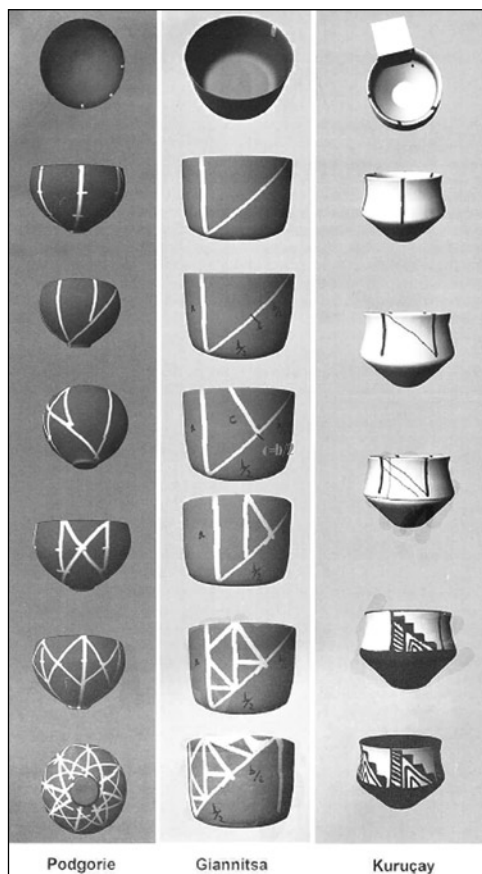


Fig. 9 – Geometric principles on the painted pottery from Podgorie, Giannitsa and Kuruçay (after TASIĆ 2007, fig. 7).

5. NEOLITHIC GEOMETRY IN THE BALKANS AND ANATOLIA

The principles of Neolithic geometry were implemented among all cultures in Southeast Europe, which produced pottery in that period. An almost identical approach toward decoration of vessels was practiced in Greece, Bulgaria, Serbia, Albania, Romania and Croatia, as well as in Turkey, where in earlier periods some of the most recognizable patterns originated (Fig. 9). These cultures used similar mathematical arrangements, but incorporated different patterns which in specific local styles were developed in authentic compositions typical for each region. V. NIKOLOV (2002) and D.K. WASHBURN

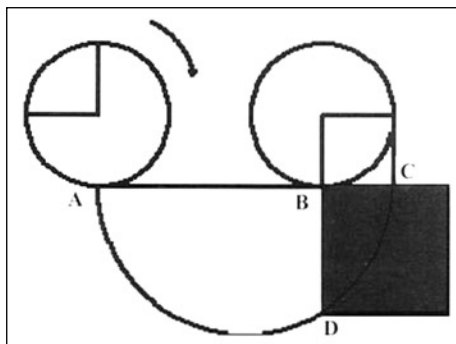


Fig. 10 – Geometrical approach towards squaring the circle (after Tasić 2007, 107).

(1984) made important contributions towards a definition of visual structures which were painted on Early Neolithic vessels from Bulgaria and Greece.

In his attempt to decipher the mathematical approach in the decoration of vessels, N. Tasić deduced the geometrical concept of squaring the circle implemented within painted compositions on vessels from Balkans and Anatolia (Tasić 2007, 2009). Analyzing pots from Giannitsa, Rakitovo, Kuruçay and Haçılar he noticed that the height of the pattern is almost identical to the radius of the pot (Fig. 9), suggesting that Neolithic potters were using principles of squaring the circle in order to precisely arrange 6 or more metopes along the vessel's surface, without having an empty space between them (Fig. 10). Sometimes vertical lines were used, which have helped in applying the geometric equitation related with the incorporation of square patterns onto spherical shell. On other vessels from Podgorie, the potters were calculating the size of each triangle (or a square made of two triangles) relative to the perimeter of the vessel. This calculation had to be in relation with the diameter of the pot, as well as with the sphere and the diameter of the base (Tasić 2007, 107).

6. COMPOSITIONAL STRUCTURES AS VISUAL IDENTITY IN THE NEOLITHIC

Morphological analysis of pattern displays that painted compositions in Macedonia were a result of firmly established conventions. The establishment of such principles indicates that in one settlement or culture these patterns were repeated for a long period of time. During the Early Neolithic, some of the compositions were applied for at least 200 years, while in the Middle Neolithic identical painted patterns were preserved for about 400 years. Some researchers suggest that, during a continuity of 450-500 years, there was a change of 27-30 generations that implemented painted decoration as a system of communication over this period (Nikolov, Karastoyanova 2003).

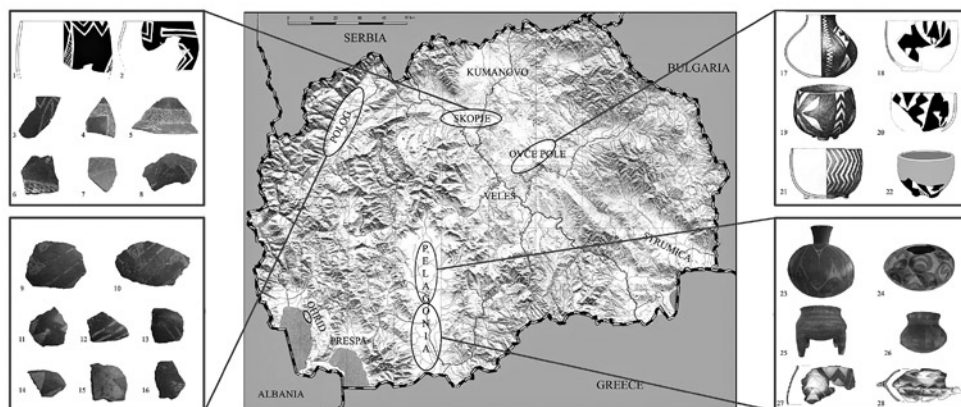


Fig. 11 – Regional Neolithic communities and their visual identities manifested through white painted pottery (design by G. Naumov). Skopje region (1-5: Govrlevo, 6-8: Zelenikovo); Polog (9-15: Stenče, 16: Dolno Palčište); Ovče Pole (17-21: Amzabegovo, 22: Nemanjica); Pelagonia (23-26: Veluška Tumba, 27-28: Vrbjanska Čuka).

The extensive elaboration of painted patterns and compositions suggests that they were used as an essential element for preserving the tradition of the community. Hence, the tradition became a result of the creation of visual memory which strengthened the community's identity. Consequently, painted vessels were used as an element of symbolic communication among the members of one community, but also they embodied the visual identity of that community. Analyses of compositional styles asserted the affinity of a certain community in a region towards concrete patterns and compositions. Considering that Neolithization in the territory of Macedonia was a rapid process, it can be observed that this quick demographic or cultural activity developed new local identities (NAUMOV 2009b). This "cultural colonization" was probably performed by a group or several individuals who inhabited a certain area and, independently or in contact with the indigenous population, created new settlements in which the elements of local identity were developed (THORPE 1999; ZVELEBIL 2001; PERLÉS 2003). Although these settlements were based on general Neolithic acquisitions (agriculture, cattle breeding, architecture and pottery), in the domain of mobile mediums authentic local features were developed.

Pelagonian design was developed according to its own principles and it was specific only to that region: complex compositions with bent lines and triangles, C and 3 patterns, lozenges, dots, angled stripes, replicated cross, etc. (Fig. 11, 23-28). Although some of these patterns were used in Ovče Pole as well, they were developed in completely different compositions. The disposition and invention of new patterns, as well as the horizontal organization

of the compositions with zigzag and “floral” patterns and stair-like triangles demonstrate that the population of this region had a sense for visual “isolation” (Fig. 11, 17-22).

In contrast to these two regions, completely new patterns and compositions appear in Skopje Plain, including bordered triangles and netted stripes (Fig. 11, 1-8). It is still too early to tell if they were synchronic with those from Ovče Pole or if they belong to Middle Neolithic painted vessels as an Early Neolithic tradition. Similar patterns were also painted in Polog, including elongated triangles and stripes with triangles resembling those both on Pelagonia and Ovče Pole pottery (Fig. 11, 9-16).

7. MIDDLE NEOLITHIC TRANSFORMATION OF THE GEOMETRIC STRUCTURES

The Early Neolithic traditions developed authentic visual features in the communities of each region in the Republic of Macedonia. These communities existed synchronically in different regions, and therefore intended to emphasize the elements of visual identification. There are noticeable differences in the selection of patterns and in the approach towards compositional structure, i.e. what is typical for Ovče Pole is not present in the Skopje Plain and vice versa. In the domain of painted decoration at the beginning of the Middle Neolithic there are apparently rapid changes. In all sites from the Amzabegovo-Vršnik group, where previously different Early Neolithic designs were present, in the sixth millennium BC new unified compositions in brown and black pigments began to be painted (Fig. 2, 7-9). These compositions often consisted of curved patterns which were developed by the multiplication of a Y motif continuously rotated within the complete composition, thus constructing a visual unit (Fig. 12).

Unlike these regions, Pelagonian Middle Neolithic was not affected by the design changes. The communities from this region maintained white painting and changed the repertoire of patterns and compositions only slightly. Still, despite the generalization of new compositions in the Amzabegovo-Vršnik group and preserving the decorative traditions in Pelagonia, the settlements in these regions shared certain visual and symbolic types of communication in the domain of patterns, beliefs and figurine production. At the beginning of the Middle Neolithic, specific white painted patterns, as well as clay models of anthropomorphic houses were produced in both of the above mentioned regions. Although some regional and typological characteristics can be noticed in the decorative and sculptural structures (NAUMOV 2006, 66; NAUMOV 2007, 258; CHAUSIDIS 2007), they integrate identical morphological and semantic features. This demonstrates that in the Middle Neolithic there was a newly established communication, which further strengthened the relations between communities in different regions.

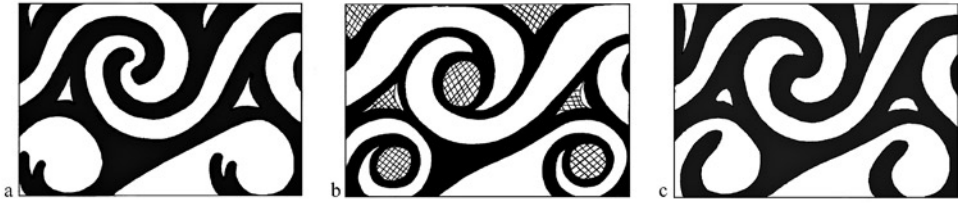


Fig. 12 – Curved compositions painted on the Middle Neolithic cups (drawings by G. Naumov).

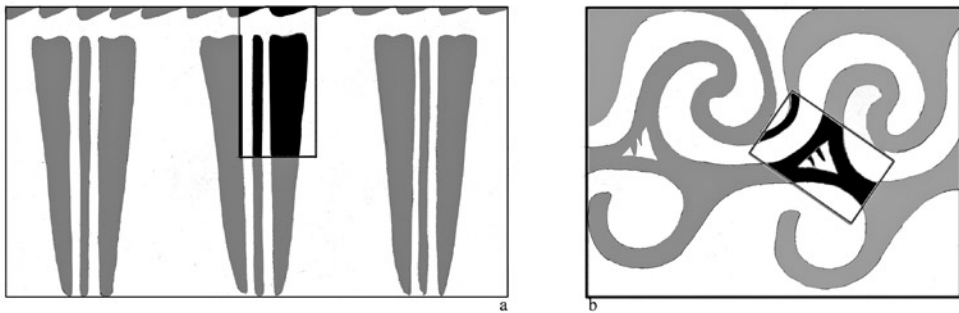


Fig. 13 – Reconstruction of a rectilinear and curved composition from Zelenikovo and Govrlevo (drawings by G. Naumov).

8. SYMMETRY ANALYSIS AND PATTERN RECONSTRUCTION

Symmetry analysis makes it possible to reconstruct the painted compositions where the definite canons and their independent and group-ordered relations with other patterns have been established. By gathering data provided by a number of preserved compositions, the compositional entireties can be identified even on shards on which elements of the defined styles are being preserved. On the fragments where parts of elaborated patterns are still visible and where it is noticeable that they are organized in an already defined compositional entity, the rest of the composition which is not preserved can be envisaged. That way, the feasible reconstruction would be approached with certain probability, mostly because one composition is not always identically repeated.

Two examples are given below, where options for the reconstruction of compositions are illustrated. Each of them, if we do not consider the dimensions, possesses enough elements for reconstruction, especially those that are most typical and which belong to the style with alternated lines in a form of a triangle, and those belonging to the style with wave-like lines in negative (Fig. 13). After the reconstruction of the fragments has been completed, we

can attempt to apply the reconstruction to the surface of the pot. When the fragments are consistently transformed into the reconstruction of a pot, an idea of the quantity and variety of ceramic production in the Neolithic can be obtained.

9. THE SOCIAL AND SYMBOLIC FEATURES OF THE PAINTED PATTERNS

Stylistic analyses of the design demonstrate that symmetry is the basic concept of the composition construction. It is used for the arrangements of the patterns and the building of the horizontal and vertical structure of the composition. Symmetry is a basic element in the perception of nature, and various populations used these visual principles whenever constructed visual unit. The patterns and symmetry are also employed as visual metaphor in the representation of the essential principles of a culture. Consequently, a culture employs the symmetrical structure of patterns as an element of metaphoric transposition of the ideological principles through an artistic medium, i.e. pottery.

The function of the visual metaphor is fundamental for preserving the basic codex and crucial concepts of the culture. Specific symmetry used for metaphoric visualization of the culture's permanent values differs between cultures, depending upon the different approach toward the conceptualization of the essential life advancements and relations (EBER-STEVENSON 1980, 121-160; CHAUSIDIS 1994, 39-67; WASHBURN 1995, 14, 51; WASHBURN 1999, 548-553; GOLAN 2003, 259-269; CHAUSIDIS 2005, 16-129). Therefore, durable mediums are usually used as an "archive" of these cognitive elements. This knowledge about the one's own culture and the world in which it exists is most often in relation with identity and religion in general.

The Neolithic painted pottery from the Republic of Macedonia also generates metaphoric cognizance of the cultures and their surrounding (Fig. 2). Symmetry analysis reveals that this visual approach has specific local features in every region, indicating that several authentic concepts existed in Pelagonia, Ovče Pole and Skopje Plain. It is still difficult to say whether these concepts were related to a common idea, but considering the identical elements of socio-economic existence, it can be assumed that all these cultures intended to represent similar perpetual processes. This was followed by the incorporation of geometric principles which except for their aesthetic or decorative utility, appeared along side the most complex cognitive processes in the Neolithic. Moreover, they demonstrate that Neolithic communities developed absolutely rational perception of space and employed its structural manifestation in the production of material culture and the ideas incorporated within.

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ABSTRACT

Neolithic pottery from the Balkans and Anatolia is well known for its remarkable and unique decoration. Very often the visual features of these objects are used for determining the relative chronology of excavated sites, without considering its potential for mathematical observation. The repertoire of patterns used for developing the compositional structures painted on the vessels provide abundant data for such analysis. Almost all of the fragments discovered so far as well as the completely preserved painted pots from these regions were decorated following several visual principles which made it possible to achieve a precise disposition of the patterns on the spherical surface of the vessel. This decorative approach was established on the basis of the standards of Neolithic geometry which employ both symmetry and the principles of visual entropy. For this reason, the painted vessels from Early and Middle Neolithic settlements discovered in the Republic of Macedonia provide a variety of information about the organization and structures incorporated on the decorated pottery. In the earlier phases these painted compositions were mostly based on The Four Rigid Motions of pattern disposition on a one dimensional format, while later, besides using this concept, the principle of asymmetry was implemented in order to compose a two-dimensional image. The aim of this paper is to identify all possible forms of plane symmetry, patterns and compositions applied in the decoration of Neolithic vessels from the Republic of Macedonia, as well to promote the use of geometric symmetry as a possibility for the reconstruction of decorated fragments.