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Textile Decoration and Patterns on the Andronovo Vessels: Possible Reconstructions

Certain researchers believe that the designs composed of oblique triangles, meander-shaped figures, and comb imprints on Andronovo vessels reproduce those on woven, embroidered, and appliqué textiles. The article compares the Andronovo designs on pottery with the decoration used in textile manufacture. To reconstruct the making of geometric compositions, textile interlacing designs were composed for producing samples using the weaving technique on tablets. Such tools were used for producing the earliest textile manufacture with an interwoven warp starting in the Early Neolithic. The sequence of patterns with vertical-horizontal, diagonal-horizontal, and diagonal-rhombic elements is described. Various types of designs were created, and the most rational decoration methods were selected. The dependence of pattern on the sequence whereby colored threads are run through holes was analyzed. To make complex patterns, rotation of tablet blocks in various directions was used. The results suggest that designs on the Andronovo vessels indeed reproduce woven prototypes.

Keywords: Andronovo culture, pottery decoration, textile decoration.

Introduction

Ornamentation on the pottery of the Andronovo people is of great interest as one of the sources indicating their material culture. The design of the decoration and structural organization of the ornamental patterns have been discussed in studies by E.E. Kuzmina (1994) and Y.I. Mikhailov (1990), and the placement of ornamental elements in zones has been analyzed in a study by S.V. Zotova (1965). Classification of the Andronovo ornamental patterns, identification of structural parts, and description of their typical features have been provided in the studies by I.V. Rudkovsky (2010, 2013). In the opinion of scholars, in order to establish the initial elements of ornamental décor, a certain basis should be identified in the form of a straight or slanting grid, into which the Andronovo patterns could be built. As a rule, the Andronovo rim ornamentation is based on the

rhythmic repetition of an initial figure. As scholars have suggested, such features of ornamental décor appearing on the Andronovo vessels as two-tonality and mosaic structure of the pattern, as well as the uniformity of the image and background, may stem from the specific nature of the appliqué work of multicolored leather, fur and felt, as well as weaving and plaiting. This suggestion was first put forward by M.P. Gryaznov, who believed that patterned embroidered clothes and plaiting, the ornamental décor of which can be imagined from the patterns on pottery, was widespread among the Andronovo population (see: (Vadetskaya, 1986: 45–46)). This idea has become supported by a number of scholars. Thus, Zotova observed that, “The example of ‘carpet’ ornamentation clearly manifests the direct correspondence between the system of constructing the Andronovo geometrical ornamental patterns and the principles of constructing the patterns

on plaited and carpet products. Most elements of the Andronovo ornamental décor are reproduced to this day in the ornamentation of carpets in Kazakhstan and Central Asia” (1965: 180). O.M. Ryndina pointed to a striking similarity between the ornamentation on the pottery of the Bronze Age and the embroidery patterns of the Ob Ugrians (1996: 26). Rudkovsky, who gathered the most complete collection of the Andronovo frieze ornamental patterns, also believed that the compositions on pottery were formed under the influence of the ornamental patterns created in the technology of patterned weaving, embroidery, and appliqué work (2013: 42). T.N. Glushkova viewed the ornamental décor on the Andronovo pottery as a certain model, reproduced on clay, of the production of sophisticated polychrome carpet patterns well-known from the textile materials of the Middle East and Western Asia. Precisely such patterns, which render the features of weaving technology, have been preserved on embroideries made with woolen threads on the shirts of the Southern Khanty and Mansi (Glushkova, 2004: 233).

Comparing the Andronovo ornamental décor on pottery and textiles

Connection between the Andronovo ornamentation on pottery and plaited and woven prototypes can be explained by the common principles of ornamental construction. This conclusion does not stand for the appliqué technique, since its patterns may have any configuration, not determined by the manufacturing technology. In the technique of cross-stitch and satin stitch embroidery, it is also possible to execute almost any pattern of comb-shaped elements.

Comparison of ornamentation on the Andronovo vessels with woven patterns has revealed their conformity:

1) geometric motifs composed of horizontal, vertical, and diagonal elements are a typical decoration of fabrics based on the interlacing of vertical and horizontal threads. Rounded elements cannot be weaved; all of them would have more or less geometric shapes. All straight lines of the Andronovo ornamentation are arranged in the same way as the threads in the fabric structure;

2) a specific feature of textile ornamentation is the balance of the background and pattern. The two-tonality of the ornamentation and indistinguishability or uniformity of the pattern and background on pottery suggest that these compositions were created on the basis of textile models;

3) all parts of the Andronovo ornamentation are interconnected like the threads in textile weave. Elements of ornamentation and intervals between them must either be the same (in the techniques of inkle weaving), or be in a certain dependence (in the technique of tablet weaving);

4) all ornamental patterns on fabrics are based on the methods of inversion (Latin *inversio* – ‘rearrangement, turnover’): the motif on the front side of fabric becomes the background on the back side. Such ornamental patterns decorated folk textiles made in the techniques of inkle weaving, counted satin stitch embroidery, and appliqué work;

5) motifs of some ornamental patterns made with the comb stamp show direct parallels in textiles among related and unrelated peoples of various countries.

These features of the Andronovo ornamentation serve as the basis for a technological experiment. First, the interlacing patterns were identified, and then tools for execution of patterns in textiles were determined. Despite the various types of patterned weaving, there are not many ways of reproducing the ornamental patterns found on the pottery.

The technique of inkle weaving is based on running the pattern thread through the entire width of the fabric. The pattern thread periodically comes out on the front side of the fabric, creating specific ornamentation. Very long runs of background, typical of the Andronovo pattern, do not correspond to this technology. To ensure that the threads do not hang on the back side of the fabric, they are moved to the front side at a certain interval. On woven belts, in the intervals between the motifs of the ornamentation, the threads form triangular figures on the front side (Fig. 1, 1). Nothing similar is observed on the Andronovo pottery, where individual motifs are separated by large background space (Fig. 1, 2).

It is impossible to reproduce the vessel’s ornamentation in the inkle technique, since the ornamental pattern results from a successive alternation of front and back stitches. To ensure that the colored thread on the back side would not hang, the runs are usually limited to overlapping 3–5 threads, not more.

Weaving technique on tablets. The most likely prototype for patterns on pottery was the ornamental décor made in the technique of weaving on tablets. This technique has different names: tablet weaving, card weaving, or weaving “on disks”. The archaeological collections include tablets (cards) made of stone, wood, bone, horn, tortoise shell, ivory, leather, and parchment. In Russian ethnography, this tool was named “tablets” or “disks”. These tools differ not only in terms of their material, but also in the size, shape, quantity, and order of holes in them. Tablets with various numbers of holes could be used in a single set, depending on the complexity of the ornamental patterns. A box with implements for weaving has been discovered in a Scythian female burial of the 5th–4th centuries BC in Southern Ukraine (Daragan, Gleba, Buravchuk, 2016: 59). The box included 19 wooden rectangular tablets with four holes each, measuring 4.45×3.21 , 3.99×2.28 , and 4.48×1.97 cm (Fig. 1, 3).

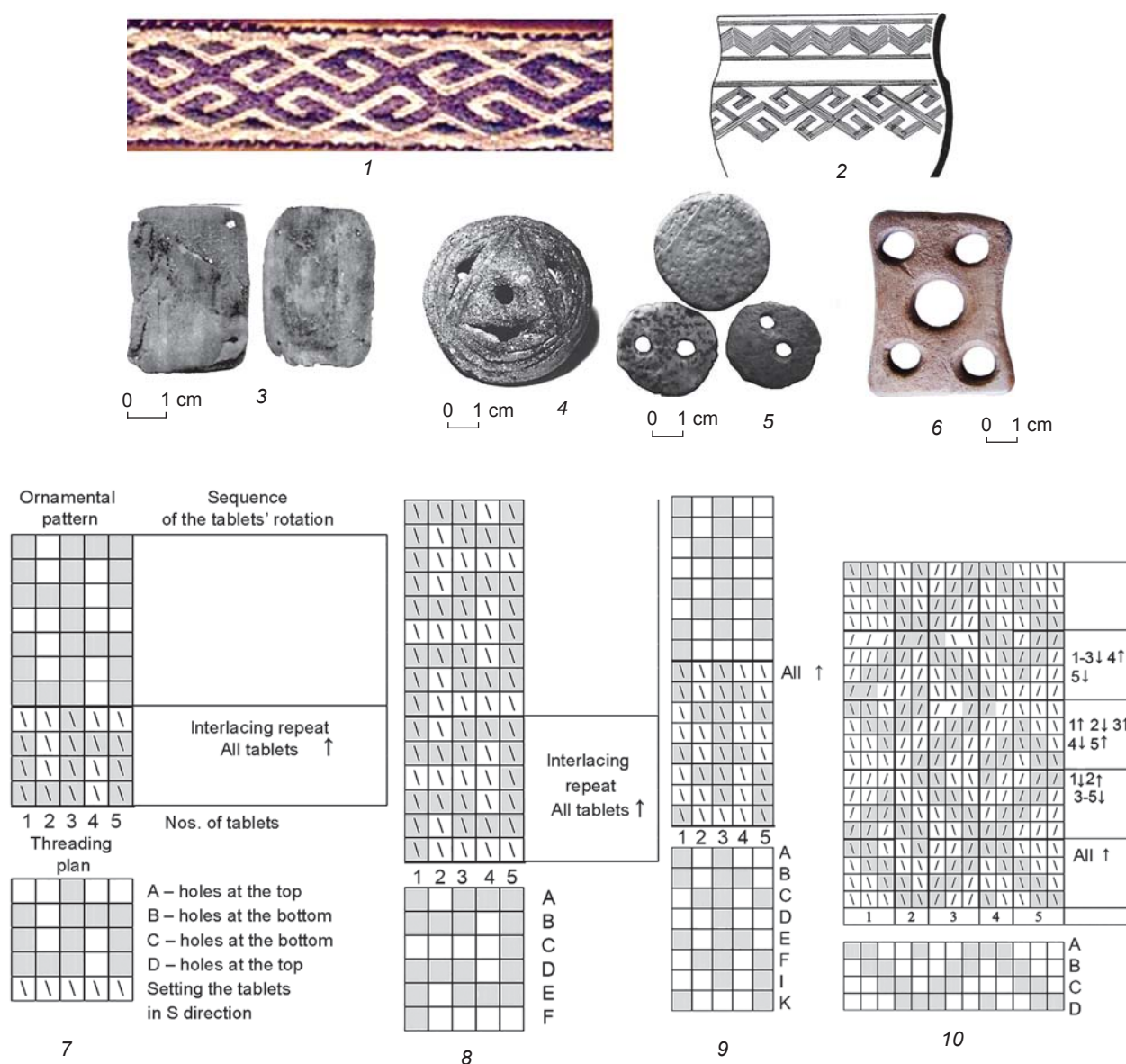


Fig. 1. Ornamentation on a belt made in the technique of inkle weaving (1), ornamentation on a vessel from Tasty-Butak, Southern Urals (Andronovskaya kultura, 1966: Pl. XXXIV, fig. 1) (2), devices for manufacturing textiles (tablets) from the Scythian burial of the 5th–4th centuries BC, at Bulgakovo, Ukraine (Daragan, Gleba, Buravchuk, 2016: 59, fig. 6) (3), device for making twined string from Valentin Peresheek, Primorye (Garkovik, 2006: 57, Pl. 7, 4) (4), clay mugs with holes from Fefelov Bor, Ryazan Region, mid 2nd to early 1st millennium BC (5), tablet-swivel from Novgorod, 10th century (6), interlacing designs for ornamental patterns: with vertical-horizontal elements for weaving on tablets with four holes (7), with vertical-horizontal elements for weaving on tablets with six holes (8), with diagonal horizontal elements for weaving on tablets with eight holes (9), and with diagonal-rhombic elements for weaving on tablets with four holes (10).

The technique of working on tablets is simple. Warp threads are passed through the holes in the tablets, after which the tablets are folded together, and the threads are stretched and fixed. With each turn of the tablets, the warp threads that are below rise to the top, and the space called the weaving shed emerges, into which the weft thread is passed. Warp threads that are threaded in the same tablet become interwoven with each other as they rotate.

Such spiral interlacing is a specific feature of the fabrics produced using this textile device.

The tablets as a universal tool might have been invented, just like spindles and weights, simultaneously in different geographical areas. The origins of this technique go back to ancient times. The assyriologist C.F. Lehmann-Haupt associated the emergence of tablet weaving in the culture of Ancient Mesopotamia with the creation

of patterned belts (1937: 45). Between the 4th and 3rd millennium BC, the fabrics made there were famous for their variety of colors and complexity of ornamentation. They were made in royal and temple workshops, where from several hundred to several thousand weavers worked. Records of weavers, dated to ca 2200 BC, have been found in the Chaldean town of Ur. The width of the cloth at that time was determined by the size of a small hand-held horizontal loom or large vertical loom. Narrow bands and sashes were woven on horizontal looms (Ocherki..., 1939). There is evidence that on large farms, weavers were loaned “copper looms” (Dyakonov, 1990: 93). Probably, these were copper plates similar to tablets with holes, since only this type of textile device was represented by a large number of identical parts, on which the width of the future product and the complexity of the pattern depended.

Scholars consider textiles with an interwoven warp to be the most ancient and archaic. A mat discovered in the cave of Chertovy Vorota (Primorye), which was made using the weaving technique with the interwoven warp of vegetable fibers, goes back to the Early Neolithic (7000 BP) (Garkovik, 2006: 51, pl. 2, 2, 4, 5). A.V. Garkovik identified a device for twining a cord of three threads, which in its shape was close to a large spinner (diameter of 6 cm), among the Neolithic finds from the settlement of Valentin Peresheek (Primorye); the device had one hole in the center and three holes along the perimeter (Ibid.: 56, pl. 7, 4) (Fig. 1, 4). The process of connecting several threads into one is called twining, and this was one of the first technologies adopted by humans. Twined threads are stronger than untwined.

The ethnographic materials from Belarus include tablets with five holes, which were used for making cords. A thick thread (or cord) that was not involved in the work was passed through the central hole. It served for strengthening the product: the weft was alternately passed under it and over it. During the weaving process, the central thread was wrapped in threads running through four holes along the edges (Selivonchik, 2009: 24). A bone plate with five holes for rope twining has also been found in the layer of the 10th century in Old Novgorod (Savenkova, 2012: 24, fig. 47) (Fig. 1, 6).

Finds in the form of disks with two holes, which were made from the walls of vessels, originating from the settlement of Fefelov Bor (Ryazan Region) and dated from the mid 2nd to the early 1st millennium BC, have been identified as parts of a loom (Folomeev, Chernay, 1984: 49–50). The diameter of the objects was 2.5–4.5 cm; the diameter of the holes was 4–7 mm (Fig. 1, 5). B.A. Folomeev and I.L. Chernay drew a parallel between clay disks and ethnographic tablets. The loom could have consisted of several disks. Threads were pulled through the holes of each disk and

were subsequently interwoven with each other during rotation. After each subsequent turn of the thread, the threads running through all the disks were connected by the weft, thus forming fabric.

N.I. Lebedeva believed that tablet weaving has been practiced since the Neolithic on the territory of European Russia, and preceded weaving *ponyova* skirts on the loom. Weaving on tablet-swivels with two holes, as Lebedeva observed, was typical of the Eastern Slavs (1956: 506, 523). Such devices for weaving as bone and wooden plates of square and rectangular shape with two and four holes, found in the layers of the 12th–13th centuries of the Old Novgorod, were used for manufacturing belts (Savenkova, 2012).

In the Scandinavian countries, the earliest examples of tablet weaving go back to the Bronze Age. At this time, tablets were part of the vertical loom and served to create the initial edge of the fabric, which was done before warping the loom. The threads of the weft of the band made on the tablets were let out on one side of the product at a length equal to that of the finished fabric, served as the warp of the vertical loom, and were stretched using weights. A rim woven on card-tablets is evidence of weaving on a vertical loom. L.R. Knudsen reconstructed the technology of making textiles from the burials in Verucchio (Italy), dated to 800–700 BC. Large red semicircular cloaks with edges woven on 36 tablets have been found in the burials. Single-colored rims with a simple pattern of textured triangles were woven into the fabric of the cloak after the main twill fabric was produced (Knudsen, 2012).

It should be noted that the most common Andronovo ornamental pattern of oblique or isosceles triangles on the vessels is composed of diagonal discontinuous lines, which could indicate the direction of the threads while turning the tablets in a certain direction. It is possible that this ornamentation reflected the texture of the fabric, and not the color of the pattern (Fig. 2, 7).

One of the examples of textile made using a large number of tablets is the band decorated with comb and swastika motifs from the Celtic tomb of 530–520 BC in Hochdorf (southern Germany). The reconstruction of a strip 6 cm wide was made using 98 tablets (Stauffer, Knudsen, 2013). Given the complexity of the execution of the ornamental décor, it can be assumed that the technology underwent a long period of development and resulted from the collective creativity of many generations.

Technological experiment

While reconstructing textiles on the basis of the Andronovo ornamentation (Fig. 2, 13–19; 3, 13–18), we used the method of experimental physical modeling based

on structural analysis. Ryndina distinguished the structure as the main principle for constructing ornamental patterns, and noted the importance of its observance in reproducing the technologies, the tradition of which was interrupted (1996: 26). Structural analysis makes it possible to apply the method of composing weave patterns on checkered paper for the subsequent creation of textile samples. The interlacing design for manufacturing textiles on the tablets includes the weave pattern, the tablet threading plan, and the sequence of tablet rotations. The interlacing pattern for producing patterned textiles on tablets should meet the following requirements:

1) motifs of the ornamentation are based on various combinations of verticals, horizontals, and diagonals;

2) the number of squares of a single color in the pattern is a multiple of two, since the minimum number of tablet rotations in the same direction equals two;

3) direction of the tablets' movement corresponds to the direction of the reproduced ornamental pattern and complies to the harmony of arranging the ornamental motifs;

4) corners in the design correspond to the rotation of tablets in the opposite direction;

5) when making one repeat, the number of turns of the tablets is minimal; the fewer the turns, the easier it is to manufacture textiles;

6) tablets are turned (in blocks) several at a time, with preference given to the option in which all tablets are turned at once.

After creating the interlacing design, it is necessary to determine in which position (S- or Z-threaded) each tablet should be, and the order of filling the holes with colored threads, that is, to draw up the threading design. This is shown below the interlacing design, which determines the direction of rotation of each tablet when color changes in the pattern, and the turning points of the tablets. The sequence of the tablets' rotation (shown to the right of the weave pattern) (see Fig. 1, 7) is the guide to the execution of the pattern. The presence of the interlacing design makes it possible to execute a pattern of almost any complexity.

All Andronovo ornamental patterns were divided into three groups, differing in the way the textiles could be manufactured on the basis of them: with vertical-horizontal, diagonal-horizontal, and diagonal-rhombic elements.

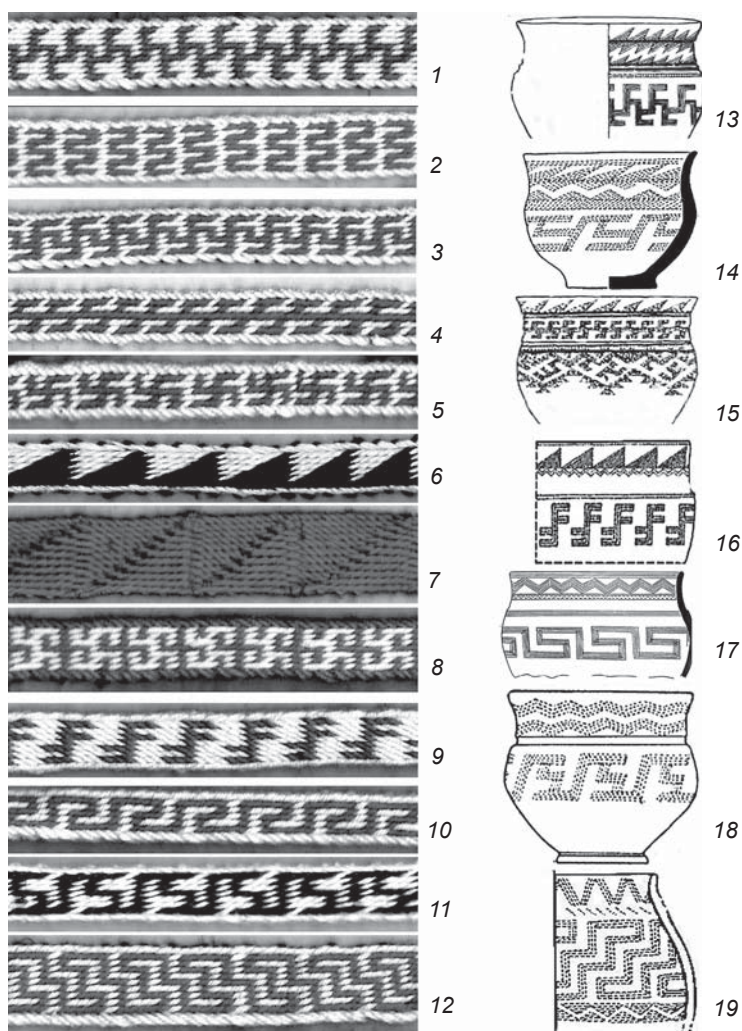


Fig. 2. Reconstruction of textiles with ornamental patterns of vertical-horizontal elements made on tablets with four (1–4, 7) and six (5, 6, 8–12) holes; ornamental décor on pottery from the Atasu burial ground (Kuzmina, 1994: 423, fig. 26, 6) (13), from the burial ground near Chelyabinsk (Andronovskaya kultura, 1966: Pl. VIII, fig. 8) (14), the Borovoye burial ground (Kuzmina, 1994: 417, fig. 206, 16) (15), the Maitan burial ground (Rudkovsky, 2013: 60, fig. 10) (16), the Tasty-Butak burial ground (Andronovskaya kultura, 1966: Pl. XXXIII, fig. 6) (17), the Fedorovka burial ground (Ibid.: Pl. IX, fig. 8) (18), and the settlement of Balanbash near Magnitogorsk (Kosarev, 1974: Fig. 1, 18) (19).

Ornamental patterns with vertical-horizontal elements. There are many tablet weaving techniques. The simplest method involves the rotation of the tablets all the time in the same direction. The pattern of the fabric thus obtained is very simple: it consists of stripes, corners, and diagonals. First, narrow bands of ornamentation composed of vertical and horizontal elements were reconstructed. Various variants of experimental designs were created, and the most efficient methods of producing patterns were selected. According to the interlacing design, the repeat of the ornamental pattern was established. In the tablet

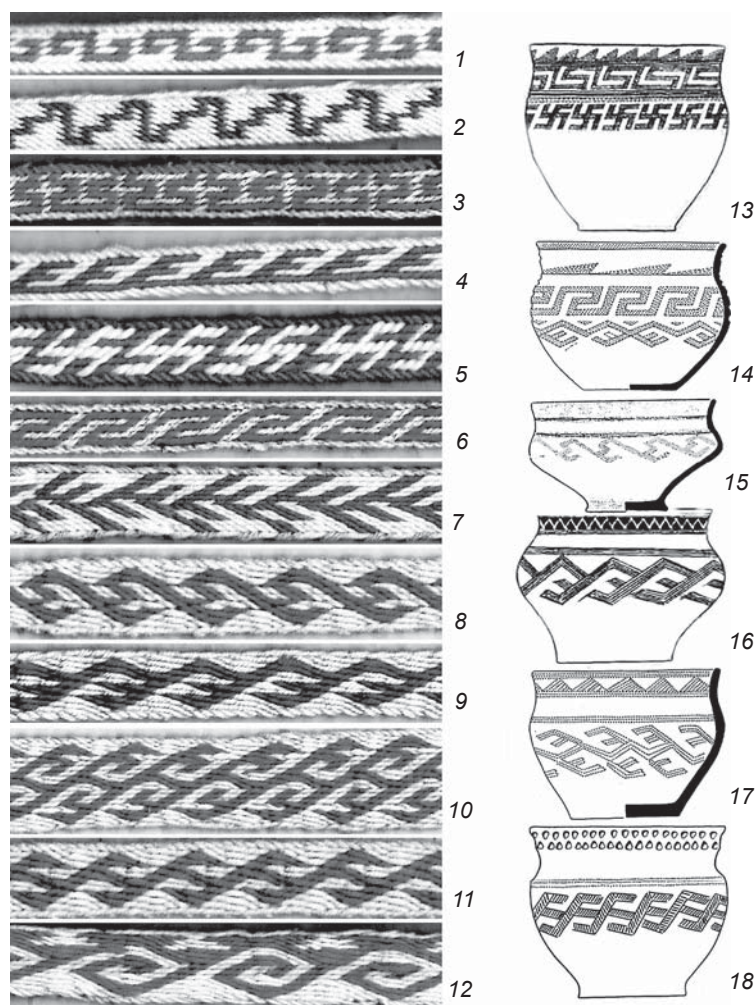


Fig. 3. Reconstruction of textiles with ornamental patterns of vertical-horizonal elements made on tablets with eight holes (1–3), diagonal-horizonal elements made on tablets with six holes (4–6), diagonal-rhombic elements made on tablets with four and six holes (7–12); pottery from the burial ground of Biyrek-Kol (Kuzmina, 2008: 185, fig. 11) (13), from the burial ground near the village of Smolino (Andronovskaya kultura, 1966: Pl. VI, fig. 6) (14), the burial grounds of Chernyaki-2 (Ibid.: Pl. V, fig. 5) (15), Khabarnoye (Ibid.: Pl. XXIV, fig. 2; XXVI, fig. 1) (16, 18), Tasty-Butak (Ibid.: Pl. XXXII, fig. 9) (17).

threading design, each cell of the pattern designates a hole with the warp thread running through it. For executing the ornamentation according to the design, five tablets with four holes each are required (see Fig. 1, 7).

The pattern of ornamentation with vertical-horizonal elements depends on the order of threading the warp threads into the holes in the tablets. Each pattern has its own color sequence. During the reconstruction, the first and fifth tablets were threaded according to the sequence: one background thread, three pattern threads; the second and fourth tablets were threaded with three background threads and one pattern thread, and the third tablet was

threaded with four pattern threads. The tablets were arranged in the following way: hole A—at the top in front, hole D—at the top closer to the weaver; holes B and C—at the bottom. On the basis of the Andronovo ornamentation, technical drawings were created, which had the interlacing repeat of four cells (Fig. 4, 5–8, 11; 5, 6). According to these drawings, fabrics were made by the simplest method of rotating the tablets in the same direction, but each ornamental pattern used its own method of threading the warp threads (see Fig. 2, 1–4).

In the process of reconstruction, it became clear that the majority of ornamental patterns have the interlacing repeat of six and eight cells (see Fig. 4, 3, 9, 10; 5, 1–5, 9, 10). Therefore, tablets with six and eight holes were used. In the threading design: hole A was at the top in front; hole F was at the top closer to the weaver; holes B–E were located clockwise below (see Fig. 1, 8). At each turn of the tablets, the weaving sheds were open, into which two wefts were passed.

The double-faced textiles obtained using these tablets have a pattern identical on the front and back sides (see Fig. 2, 5, 6, 8–12, 3, 1–3). Such double-warp weaving might have preceded manufacturing double-warp *ponyova* skirts on the horizontal loom. Ethnographic materials from the Ryazan and Tambov Governorates, as well as archaeological finds from Old Novgorod and other territories of Medieval Rus, present the unique technology of weaving such skirts.

Ornamental patterns with diagonal-horizonal elements. When setting the tablets in the S or Z direction, we may obtain diagonal patterns. These can be done with a simple technique: each pattern thread in the next tablet becomes shifted by one cell (see Fig. 1, 9). The Andronovo ornamental patterns have various angles

of inclination of the diagonal elements. The angles may depend, among other things, on the thickness of the threads used and the degree of their twining: the thinner the thread, the smaller the inclination angle of the diagonal element, approaching a vertical line (see Fig. 3, 4–6; 4, 1, 2). Ornamentation in the form of slanting swastikas is made on tablets with eight holes, which are arranged in the same way as for weaving of ornamentation with vertical-horizonal elements in the same direction. The threads were threaded in the holes strictly according to the design; all tablets were rotated in the same direction (see Fig. 1, 9).

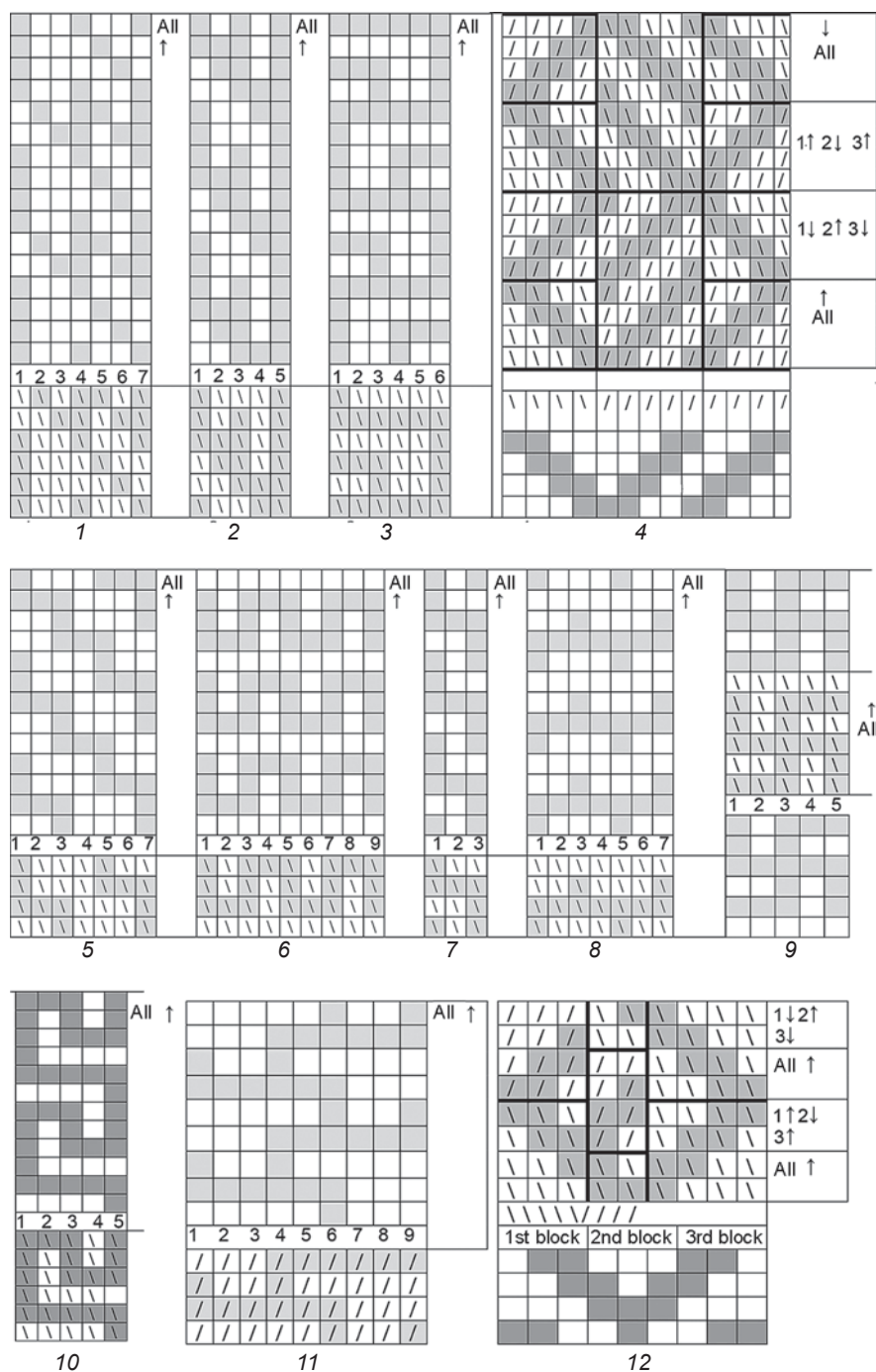


Fig. 4. Designs for weaving on tablets with six (1–3, 9, 10) and four (4–8, 11, 12) holes.

Ornamental patterns with diagonal-rhombic elements.

The most sophisticated compositions were made using the method of rotating tablets with four holes in different directions in a certain order (see Fig. 4, 4, 12; 5, 7, 8).

More sophisticated textile structures can be created by having two or more blocks of tablets, which work in a certain sequence. One block may rotate all the time forward, while the other blocks may rotate forward and

backward. This method of weaving is called “Egyptian diagonals”; its essence is that the interlacing structures consist entirely of diagonal lines. Specialists suggest that this method originated in Egypt. The tablets are threaded with two light colors and two dark colors (see Fig. 3, 7–12).

For manufacturing the textiles based on ornamentation of the vessel discovered at the Tasty-Butak burial ground,

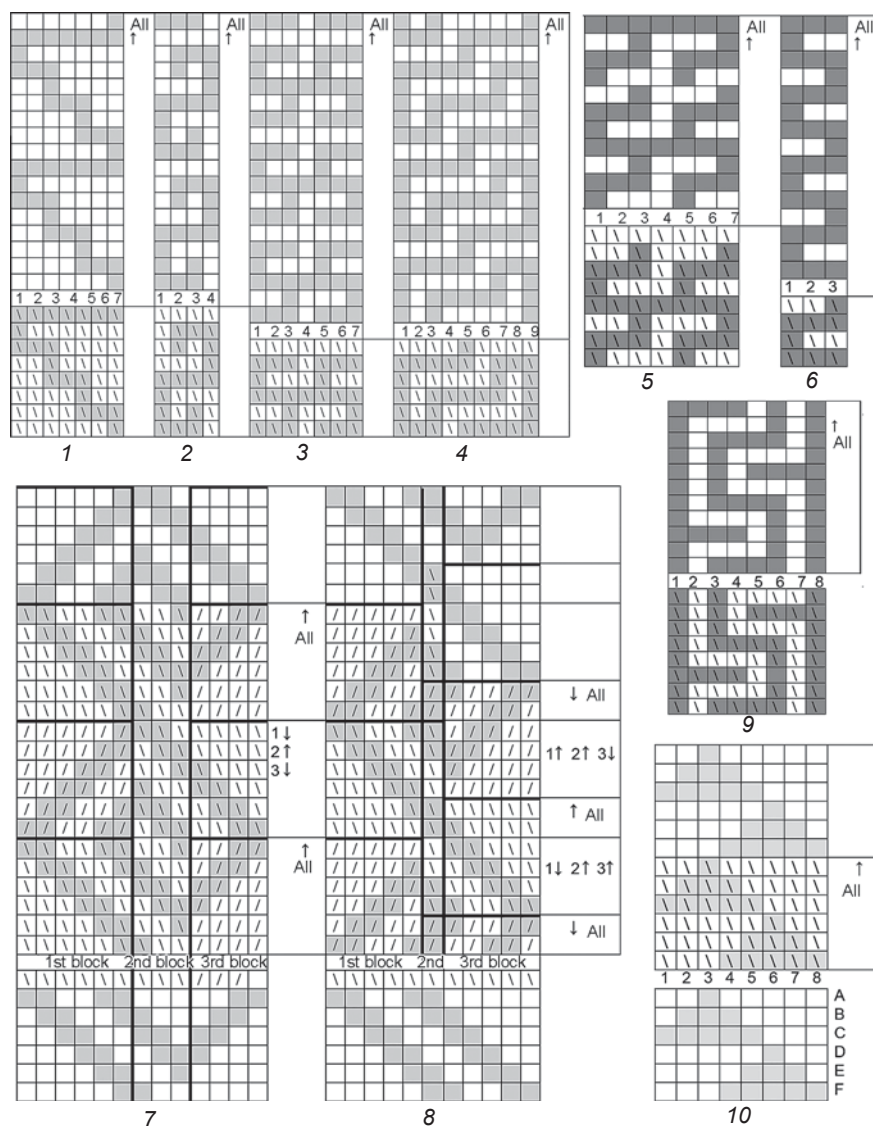


Fig. 5. Designs for weaving on tablets with eight (1, 2, 5, 9), six (3, 4, 7, 8, 10) and four (6) holes.

fifteen tablets were divided into five blocks (see Fig. 1, 10). The tablets included in the first, third, and fifth block rotated forward and backward every four rows, and the tablets of the second and fourth blocks rotated forward and backward every eight rows. The repeat of the weave consists of four stages.

In the event of an interlacing repeat of six or eight cells, the large number of threads pulled through the tablet makes it possible to create a wider background space in relation to the pattern, which corresponds to the composition of the Andronovo ornamental patterns. In this case, only one pattern thread runs through the end tablets, while the background threads run through the rest of the tablets.

Conclusions

For verifying the suggestion by M.P. Gryaznov and his followers concerning the connection between the decoration on pottery and ornamentation on clothing, an experiment was conducted, which was intended to recreate the techniques of decorating textiles. Twenty five Andronovo ornamental patterns were subjected to structural analysis; on their basis, interlacing designs were made (see Fig. 4, 5) and fabric examples were created (see Fig. 2, 3). It has been established that all these compositions are built using the principle of creating textile ornamental patterns, and this means that textile ornamentation might have served as a basis for pottery ornamentation.

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