DAGMARA ŁACIAK

CONVENTIONS OF ARRANGING DECORATED SPACE ON CERAMIC SURFACES IN THE HALLSTATT PERIOD – A METROLOGICAL AND EXPERIMENTAL APPROACH

The shape and ornamentation of ceramics have become the subject of very different studies ranging from their manufacturing, aesthetic, symbolic value and concluding with a diagnostic element that allows for the placement of past events in time and space (e. g. Arnold 1999, 1. 4-12; Rice 2005, 24-25. 435-438).
The aim of this paper is to identify the rules of the arrangement of decorative motifs on ceramic vessels that are dated to the Hallstatt Period. Theoretical studies on ceramic decorative styles and ceramics dated to the Late Bronze Age and the Early Iron Age were the basis for archaeological experimentation in pottery manufacturing. The aim was to determine the potential arrangement of decorative elements on the surface of vessels. The results of the archaeological experiments will be presented in relation to theoretical considerations about the perception and spatial organisation by the Hallstatt societies.
Firstly, the spatial arrangement is not only related to decorative styles and stylistic analysis, but also to metrology. There are many approaches to decorative styles, but regardless of this, each style needs components to create the design and fill the space available for decoration including such elements as motifs, configuration, basic units, layout and structure (Rice 2005, 248).
Ancient metrology – the science of weights and measures – is very well recognised and described by studies in art, architecture and philosophy (e. g. Tobin 1975; Jones 2006). This approach rarely appears in the prehistoric archaeology (e. g. Pare 1999; Dzbyński 2008; Gralak 2013; Bugaj 2015). The principles of metrology are also one method of interpreting ceramic ornamentation. Successful results have been achieved by such analyses that were carried out on Attic geometric pottery (e. g. Andreae 1979; Benson 1987).

BACKGROUND TO THE HALLSTATT POTTERY

Hallstatt Period ceramics are the dominant material source and are one of the most recognisable groups of artefacts of this period. A significant part of this pottery and the so-called special forms (e. g. zoomorphic vessels, goblets in the shape of a horn, etc.) are covered by ornamentation. Due to the survival of considerable amounts of pottery down to the present day, most of which are very well preserved, it is possible to reconstruct the shape of the form and the ornamentations in full.
The ornamentation of the Hallstatt Culture on these ceramic artefacts is widely recognised as being geometric (e. g. Keller 1939, 28; Schlette 1984, 169; Kossack 1993, 140. 144). Pottery assemblages may be characterised by a specific number of common features which have a similar, repetitive form and vessel size, particular decorative elements and whole ornamental compositions placed on the vessel's surface.
Studies of ceramic ornamentation led to the conclusion that individual motifs, namely the elements that make up the complex compositions, are repetitive and can be divided into a set of common features. Most of them are geometric shapes such as triangles, circles or quadrangles (e. g. Keller 1939, 28-33; Siegfried-Weiss 1979; Schlette 1984, 170-175; Koutecký 2001, 309-318; Brosseder 2004, 15-18).
In the most complex ornamental compositions, larger elements are identifiable that are somewhat basic, but which dominate the other components of the composition by their greater size (e. g. Brosseder 2004,

17). They are accompanied by other much smaller elements, e. g. lines, which can be considered as additional fillers for space. The entire decoration provides an expanded but coherent composition consisting of several different motifs usually observable on the external surface of pottery. Very rarely, however, do the same ornamental compositions consisting of the same decorative motifs in the terms of shape and number occur. These are the general and common characteristics, seen also in the course of my research work on ceramic materials from the Late Bronze and the Early Iron Age originating from south-western Poland (some of which have been published: Łaciak 2005; 2008; 2010; 2012; Józefowska/Łaciak 2012; Łaciak/Markiewicz 2013; Łaciak/Orlicka-Jasnoch 2013; Łaciak/Nowak 2016).

EXPERIMENTAL POTTERY MAKING

Theoretical studies on Late Bronze and Early Iron Age pottery and features observed on material ceramic sources were the basis for archaeological experiments in pottery manufacturing. Ceramic examinations involve the reconstruction of pottery making techniques to confirm the hypothesis put forward earlier, and also the method of decorating the vessels. After forming a precise copy it should be able to determine the strategy of arranging the ornaments while taking into account the technical possibility of the period.
The most inspiring for reconstructing pottery manufacture was the experience of making painted pottery. The preserved painted fragments are characterised by the gentleness of the brushstrokes, the lack of any traces of grained paint or traces of brush bristles. Frequently, the drawing is very careful, as usually the lines are straight. Sometimes a slight deviation in the lines or different sizes of decorative elements, are noticeable, which could suggest that they were made »freehand«. Nevertheless, they are always placed symmetrically to each other and to the whole of the composition, and also in the construction of the vessel, giving an impression of cohesion and harmony in the whole ornamentation.
The arrangement of motifs is not complicated when there is just a small number of them (**fig. 1, 1-4**). When the composition is not expanded, the applied motifs are uniform (e. g. triangles) and repetitive (**fig. 1, 5**). The number of repetitive decorative motifs could be an attempt to divide the space into subdivisions where motifs could be placed (**fig. 1, 5**). Placing patterns on the surface was done somehow »intuitively« through evaluating one's own activity during the decoration of the vessel's surface. The case becomes complicated by a large number of different looking motifs, but it should be kept in mind the symmetrical and repetitive (usually triple) location because that was observed in the source material.
My experiences in pottery making were complicated in terms of production and also in the placement of ornamental motifs. It will be presented based on the reconstruction of the painted »waggon model« from the cemetery in Domasław, location 10/11/12 (pow. wrocławski, woj. dolnośląskie), in the Lower Silesia region of Poland. The site is distinguished from other sites situated not only in Poland but also in Central Europe by the unique burial architecture, the number and variety of artefacts constituting the funerary content, including ceramic vessels, products made of bronze and iron e. g. tools, weaponry, decorations, as well as products made of amber, glass and gold. The analyses revealed that this region was intensively utilised by a society characterised by extensive contacts with the most important cultural centres of Central Europe at that time. The conclusions obtained from these analyses allow for a new look at the material culture and social structure and to put forward the concept of treating the Silesian region, a part of Greater Poland, and perhaps Kujawy as a regional north-eastern province of the Hallstatt Culture (Gediga 2007; 2011; 2013). Thus, the cemetery in Domasław becomes a representative site for this cultural unit. In the graves from the Hallstatt Period, the largest collection of painted pottery known to date from Poland (382 items) was identified. This kind of ceramic began to appear in the 5th period of the Bronze Age and was created locally, i. e.

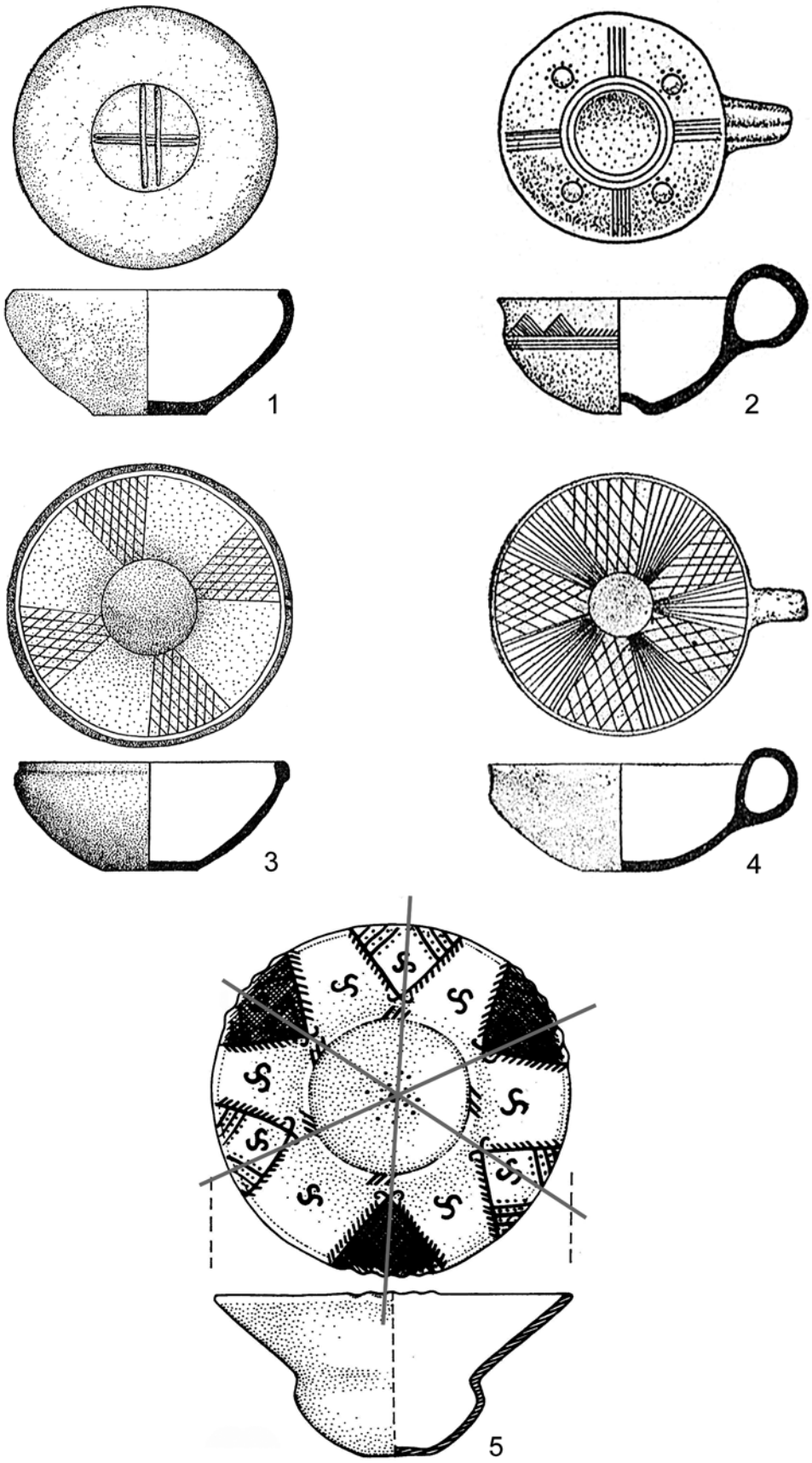

Fig. 1 Simple ornamentation consisting of repetitive and uniform motifs with a suggestion of the arrangement of the decorated space: **1-4** Kietrz (pow. głubczycki, woj. opolskie/PL). – **5** Proszkowa (pow. wołówski, woj. dolnośląskie/PL). – (1-4 after Gedl 1973, figs 43, 8; 45, 8; 100, 3; 103, 12; 5 after Domańska 1997, fig. 4, 3). – Not to scale.

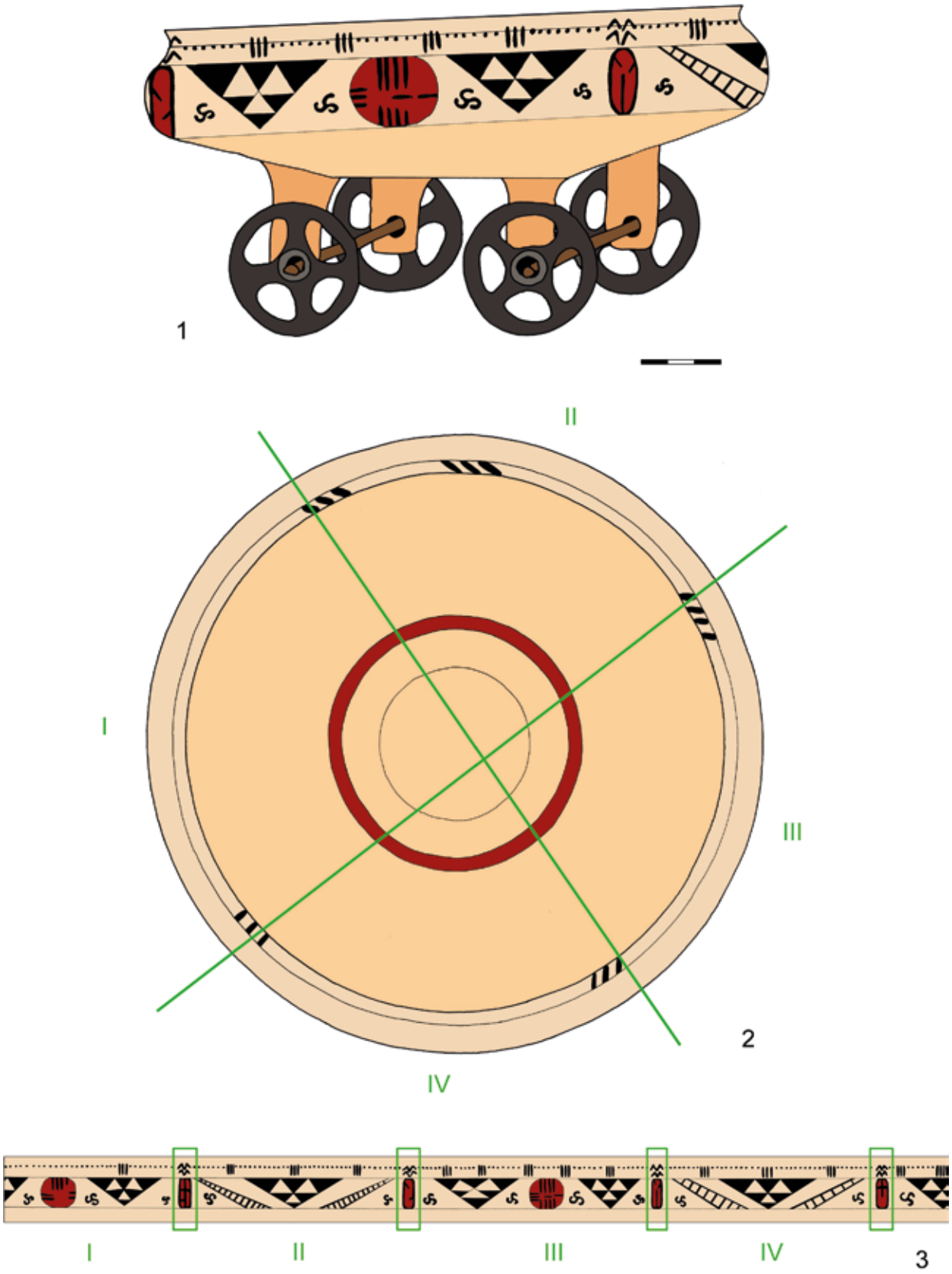

Fig. 2 The method of arranging the composition using a large number of different motifs: **1** »waggon model«. – **2** division of space by four quadrangle motifs placed on the belly. – **3** the whole ornamentation divided into four sections using four quadrangle motifs. – (After Gediga 2007, fig. 9). – 3 not to scale.

Fig. 3 Using straight sticks to place four quadrangle motifs which divided the space into four roughly equal sections. – (Photo M. Łaciak).

in south-western Poland, but under the influence of the Hallstatt Culture (Łaciak 2010). Particular attention should be paid to the painted »waggon model« (*Kesselwagen*). The funerary context may be a confirmation of the kind of burial practices known as *prothesis* or *ekphora* (Gediga 2012).

The painted »waggon model« consists of a bowl placed on short legs (**fig. 2, 1**), four spoke wheels belong to them which originally formed part of the »waggon model«. The complex ornamentation on the bowl's belly required examination to ascertain the proper arrangement of individual motifs in order to create a coherent composition. The composition of the bowl is one of the repetitive motifs: triangles, ladder shapes, triskelions, quadrangles, circles, lines and dots. On the neck are dots and lines that encircle it, but do not participate in the ornamental parts on the belly but act somehow as a supplement to the whole ornamented bowl. On the belly are six triangles (on both sides there are the motifs of circles and quadrangles or only quadrangles). This selected area was placed between four quadrangle motifs, which divided the surface into four sections of about equal size (**fig. 2, 2-3**). Two opposite sections show triangles together with the ladder motif; the other two sections are ornamented with triangles and circle motifs. To divide the belly into four equal parts, the potter might have used two simple sticks placed on the rim of the bowl. Their criss-crossed ends marked points under which are four quadrangle motifs (**fig. 3**), which also limited the space in which a repetitive sequence consisting of a triangle, a ladder motif and a circle was placed. Using string would have made it difficult to relate to the painted motifs while painting because it was unstable. Sticks placed on the rim allow the painting to be controlled in the designated areas without drawing (painting or engraving) adjacent lines.

In the designated areas most primary and dominant elements (triangles and ladder motifs) were placed, which were the point of reference for the following motifs to be placed around or in them. It would not have been possible if they were not geometric motifs. They determine the way of organising the space and the arrangement of motifs. The noticeable symmetry, the maintenance of similar proportions of ornamented space and the placement of these motifs in them allowed for producing the whole ornamentation in this manner. Perhaps other solutions are possible, but those invented during the experiment seem the most conducive to achieving the ornamentation pattern, taking into account the realities at that time.

DISCUSSION

Making pottery and ornamentation requires considering the design and the space to be decorated (surface of the vessel) using well-known motifs. Furthermore, the particular sections within which motifs were placed and they are more or less the same size, are proportional to each other and to the whole composition. However, they are not the same size and in the source material, it is also difficult to find two vessels covered with the same ornamental compositions.

The repeatability of similar looking decorative motifs, the similar arrangement of the ceramic surface designated for ornamentation required the existence in these areas of similar knowledge of the producers, well-known for producing ceramics, and their customers. There were groups of people, for which the purpose and value of these items had to be similar. The diagnosis of contemporary ideas of space perception and space organisation on small objects like pottery is a difficult matter, especially in prehistoric Central Europe, where no written sources existed.

The geometric ornamental style based on geometric shapes can be placed within the comprehensive phenomenon of *koine* of geometric styles of the Early Iron Age, which included the area of temperate zones of Europe and parts of Asia (Bouzek 2008, 125). Its origins date back to 1200 BC and the Late Helladic Period III C in Greece and it flourished in the 10th-8th century BC. Geometric *koine* in the south lasted until the end of the 7th century BC, while in the north it continued for another 200 years. The most sophisticated version of this family of styles that developed in Greece, Italy, and Hallstatt Period styles of Central Europe are simpler varieties of *koine*. The first signs of the development of this style can be placed in the Hallstatt Period A, where *koine* roots were in the Urnfield Culture of Central Europe, whose ornamentation, and above all, solar symbols, have been taken as universal (Bouzek 2008, 134).

The Europe-wide trend of the geometric style in the context of the phenomenon of *koine* could be the heritage of the ancient world, where geometric motifs so common on Hallstatt Period types of ceramics were derived. This is what the ancient Greeks, philosophers and artists established by drawing on the principles of metrology. We find the sources (literary, iconography and material) that enable the recognition of this influence in the ancient world, which can also be found in the construction and decoration of works of art or architecture.

From the earliest days in the ancient Greek art there was a common opinion that what is predictable and regular is also understandable and beautiful for the mankind, and what was irregular meant chaos and could be neither beautiful nor good. This idea appears first with the Pythagoreans; however, it had to correspond to the inclinations of the Greeks, as adopted universally and forever (Tatarkiewicz 1988, 93).

From the classical period of ancient Greece, all the efforts of philosophers and artists were concentrated on the search for universal principles that ordered the universe and all existence on earth. In the classical Greek art, all artists were obliged to comply with the form called *canon*. For visual artists the »*canon*«, which is a

measure, was most often concerned with proportion and was expressed by a number. They believed that there was a *canon* and that it should be known, so they studied the proportions found in nature and devoted much attention to the anatomy of the human body. The aim was to discover an »anthropometric canon«. Greek artists sought not to create a perfect work of art, but they had general knowledge of the mathematical nature of their man-made surroundings. It was a time when »hard« rules of art were established (Tatarkiewicz 1988, 57. 60. 69).

The researchers of the Greek vases pay attention to their resemblance to monumental art, which consisted, among others, in »the proportions used in a vessel expressed in the ratio of the height to the width of the vase, are to each other as the height of the column to its diameter, and the size of the head of the statue to their height« (Bernhard 1966, 11-12). They managed to find the permanent geometric proportions of the Greek vases. One of the mentioned groups is based on the principle of a square, that is, a ratio of the height to the width of 1:1. The second identified group of vases has a ratio of the height and the width of about 1:0.618 (Tatarkiewicz 1988, 6-68 fig. 11).

Returning to the ornamentation, attention is drawn to the proportional arrangement of the decoration and the ability of the ancient Greeks in this matter, which could have resulted from the perfection of the art of pottery (Bernhard 1966, 11-12). Another principle of Greek art, which is also visible in ceramics, is to highlight the structure of the object. Therefore, the decorated surface of the vessels was divided into zones, filled with various motifs, in order to draw attention to particular parts of the vessel (Bernhard 1966, 21).

In the world of the ancient Greeks, there was an emphasis on keeping the rules for determining the size of an element in relation to the whole, which resulted in the retention of a mutual ratio. This principle also concerned ceramics. How could the dimensions of ornamental compositions be outlined in the absence of numbers and mathematical calculation at that time (Hallstatt Period)? Are there traces which may be affected by procedures aimed at planning the decorated surfaces?

Researchers are in agreement about the fact that the ancient patterns and anthropometric measures referred to the natural proportions of the human body (e. g. Kula 1970; Tatarkiewicz 1988, 60. 64). To explain the practical aspect help may come from the statement of Protagoras »Man – the measure of all things«. It refers to the anthropocentric position but also is »a statement of the status quo, a generalization of the system, in which each man using parts of his own body measures all things« (Kula 1970, 43). Measures were common, most understandable and could be applied because they were invented and used by man (Kula 1970, 44-46).

Referring again to the studies of the classical Greek vase painting, researchers concluded that less experienced painters sketched drawings, while more experienced ones worked out with care how the shapes could be accommodated in the field offered. Black compositions were done by scratching the object with a brush and then filled out with the desired outline. Red compositions were sketched by short, repetitive strokes of an implement, which could have been charcoal. The black lines disappeared during firing. It is very important that specialists involved in the ceramic study of the ancient Greeks have not detected the existence of any suggestion that a grid or other aids were used for determining the proportion or copying other drawings at the same or a different scale (Boardman 2001, 287-289).

CONCLUSION

Archaeological experiments proved that it is possible to arrange, divide and produce decoration on the space according to geometric motifs by using very simple tools which leave no traces on the surface of the pottery. The manner of spatial division and the arrangement of the decorated motifs could be the most

problematic thing. The geometric and repetitive motifs are helpful and are arranged symmetrically to each other and to the whole ornamental space. The number of decorative motifs could also have helped to divide the space into an appropriate number of decorated and separated areas. Other complicated compositions consisting of many different motifs could be divided by identifying the main motifs that are usually larger than the others which subdivide the space. However, repetitive geometric elements and motifs which are the main characteristics of pottery ornamentation, those which are primary and dominant are the points of reference for other motifs placed around or in them. It would not have been possible if it were not for geometric motifs. They determine this manner of organising the space.

The person who created the ornamentation must have been very familiar with the decorative motifs, the surface and the patterns to place on it. The ornaments were made intuitively, using awareness of their own body and experience gained in pottery manufacturing using a specific and universal set of decorative motifs. Practical skills were conditioned by an existing geometric set of elements, joined together on the principle of symmetry and proportion.

However, ignorance of numbers, mathematical interpretation and measuring instruments did not interfere in the composition and execution of proportional compositions. The experimentation of ornamentation on the surface of vessels proves that this is possible without using complicated tools. What is important is one's own perception of ornamented space through the prism of decorative motifs (in this case geometric ones). It is the human body that provides all the necessary measuring instruments.

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Zusammenfassung / Summary / Résumé / Streszczenie

Regeln bei der Anordnung des Keramikdekors der Hallstattzeit – ein metrologischer und experimenteller Ansatz

Dieser Aufsatz beschäftigt sich mit der Anordnung von Dekorelementen auf Keramik, wobei nicht nur Ornamentik und stilistische Analyse, sondern auch die Metrologie mit einbezogen werden. Theoretische Studien zum Keramikdekor der späten Bronze- und frühen Eisenzeit stellten die Basis für die archäologischen Versuchsreihen zur Keramikproduktion dar. Ihr Ziel war es, die mögliche Verteilung von Dekorelementen auf den Gefäßoberflächen zu rekonstruieren. Experimente zur Keramikherstellung waren dabei in Hinblick auf die Produktion nicht einfach; auch die Platzierung der ornamentalen Motive sollte anhand der Rekonstruktion des bemalten Kesselwagens aus dem Gräberfeld in Domasław, Fundstelle 10/11/12 (woj. dolnośląskie/PL) nachvollzogen werden. Die praktischen Schlussfolgerungen sollen auf die theoretischen Überlegungen zu räumlicher Wahrnehmung und Verteilung bezogen werden. Theoretische Betrachtungen werden mit Vorstellungen aus dem antiken Griechenland verbunden und dann auf die Hallstattzeit übertragen.

Conventions of Arranging Decorated Space on Ceramic Surfaces in the Hallstatt Period – a Metrological and Experimental Approach

This paper focuses on the arrangement of decorative motifs on ceramic surfaces, which is not only related to decorative styles and stylistic analysis but also to metrology. Theoretical studies on ceramic decorative styles and ceramics dating to the Late Bronze Age and Early Iron Age were the basis for archaeological experiments in pottery manufacturing, the aim of which was to find a potential arrangement of decorative elements on the surface of vessels. Experiments in pottery making were complicated in terms of production, and also the placement of ornamental motifs will be presented based on the reconstruction of the painted »waggon model« from the cemetery in Domasław, site 10/11/12 (woj. dolnośląskie/PL). The practical conclusions will be referred to theoretical considerations about the way in which space was perceived and arranged. Theoretical reflections will be associated with ancient Greek ideas and then applied to the Hallstatt Period.

Les règles de l'arrangement des espaces décorés sur les céramiques hallstattiennes – une approche métrologique et expérimentale

Cet article traite de l'arrangement des motifs décoratifs sur les surfaces des céramiques qui n'est pas en relation qu'avec les styles décoratifs et leur analyse mais également avec la métrologie. Des études théoriques sur les styles céramiques décoratifs de poteries de la fin de l'âge du Bronze et du début de l'âge du Fer ont été la base d'expérimentations dont le but était de saisir le lien potentiel entre l'agencement des décors sur la surface. Les éxpérimentations ont été complexes à mener en termes de production comme d'emplacement des décors. Ils seront présentés sur la base de reconstitutions du chariot miniature peint de la nécropole de Domasław, site 10/11/12 (woj. dolnośląskie/PL). Les conclusions pratiques feront référence à des considérations théoriques sur la perception de l'espace et la manière de placer les décors. Les refléxions théoriques sont liées à celles des idées de la Grèce ancienne et ont été appliquées à la période hallstattienne. Traduction: L. Bernard

Zasady organizacji przestrzeni dekorowanej na powierzchniach ceramiki w okresie halsztackim – podejście metrologiczne i eksperymentalne

Artykuł skupia się na zagadnieniu rozmieszczenia motywów dekoracyjnych na powierzchniach ceramiki, co łączy się nie tylko z pojęciem stylów dekoracyjnych oraz ich analizą ale także z metrologią. Studia teoretyczne nad stylami zdobniczymi w ceramice i ceramiką datowaną na późną epokę brązu oraz wczesną epokę żelaza były podstawą do przeprowadzenia eksperymentów archeologicznych nad wytwarzaniem ceramiki, których celem było znalezienie potencjalnego rozwiązania w rozmieszczeniu elementów zdobniczych na powierzchni naczyń. Eksperymenty nad wykonaniem skomplikowanych kompozycji motywów ornamentacyjnych zostały zaprezentowane na podstawie rekonstrukcji malowanego »modelu wozu«, pochodzącego z cmentarzyska w Domasławiu, stan. 10/11/12 (woj. dolnośląskie/PL). Rozważania teoretyczne łączą się z poglądami pochodzącymi ze starożytnej Grecji, co w dalszej części artykułu zostało przeniesione na okres halsztacki.

Schlüsselwörter / Keywords / Mots clés / Słowa kluczowe

Polen / Hallstatt / frühe Eisenzeit / Keramik / Dekor / Metrologie / experimentelle Archäologie
Poland / Hallstatt / Early Iron Age / pottery / decoration / metrology / experimental archaeology
Pologne / Hallstatt / Premier âge du Fer / céramique / décoration / métrologie / archéologie expérimentale
Polska / okres halsztacki / wczesna epoka żelaza / ceramika / zdobnictwo / metrologia / archeologia eksperymentalna

Dagmara Łaciak
Uniwersytet im. Adama Mickiewicza w Poznaniu
Institute of Archaeology
Umultowska 89D
PL - 61-614 Poznań
daglac@amu.edu.pl