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Research Article

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The Ugly Duckling: Understanding the Making of an Early Copper Age Atypical Ceramic Vessel from the Great Hungarian Plain

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Abstract: The present study focuses on an Early Copper Age (4500–4000/3900 cal BC) atypical ceramic bowl from Tiszagyenda-Vágott-halom (Eastern Hungary). At first glance, the bowl was strikingly different from the other well-executed, often richly decorated bowls known from the site. Although such vessels can be found sporadically in other Early Copper Age sites, they have never been studied to see exactly how they differ from typical pottery. The aim of the present study is to understand the ideas, intentions, decisions, knowledge, and skills of the potter who made this vessel by reconstructing the *chaîne opératoire* of the making of the bowl. Technological and stylistic analyses suggest that the atypical pot was probably made by a beginner potter. The stylistic elements (form and decoration) are common in the pottery repertoire of the site and are not considered exceptional, apart from the quality of the execution. The deviation from the usual pottery-making techniques, however, suggests that the potter had probably not acquired all the pottery-making traditions of the community.

Keywords: ceramic technological analysis, stylistic analysis, ceramic fabrication process, apprenticeship, *chaîne opératoire*

1 Introduction

After the Late Neolithic on the Great Hungarian Plain (Eastern Hungary), several aspects of life began to transform into the Copper Age. Among others, the first formal cemeteries in the region were established (Bognár-Kutzián, 1963, 1972; Patay, 1961, 1974) – along with keeping the Neolithic custom of settlement burials (Gyucha, 2015; Parkinson, Gyucha, & Yerkes, 2021; Raczky, Anders, & Siklósi, 2014; Szilágyi, 2015) – and a dispersed settlement pattern consisting of small hamlets appeared as a replacement of large, sometimes tell-centred Late

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Neolithic settlements (Parkinson, 2006a,b; Parkinson & Gyucha, 2007; Sherratt, 1982, 1983a,b). Research into the Early and Middle Copper Age has undergone radical developments in the last two decades. The generally accepted picture of the period has changed fundamentally during the twentieth century, due to a number of partly interrelated factors. One of the most important changes relates to the absolute and relative chronology of the period. Until the early 2000s, the Tiszapolgár culture was dated to the Early Copper Age (4500–4000 cal BC), while the Bodrogkeresztúr culture was dated to the first half of the Middle Copper Age (4000–3700/3600 cal BC) (Banner & Bognár-Kutzián, 1961; Bognár-Kutzián, 1963, 1972, 1985; Kalicz, 1958; Patay, 1961, 1974). There are several hundred sites dated to this period known today in the Great Hungarian Plain, which was, unlike today, a very diverse landscape full of meandering rivers where flooded, semi-flooded, and dry areas alternated with each other.

In the 2010s, however, it became clear based on several new AMS dates that although the Tiszapolgár culture can still be dated between the forty-fifth and forty-first century cal BC, the Bodrogkeresztúr culture is to be dated between the forty-fourth and fortieth/thirty-ninth century cal BC (Siklósi & Szilágyi, 2021, p. 35). According to this new and better-supported chronology, it has become clear that the two archaeological cultures, separated mainly by pottery style and other stylistic elements of the material culture, were partially contemporary (Raczky & Siklósi, 2013; Siklósi *et al.*, 2022; Siklósi & Szilágyi, 2016, 2021).

The other important change was that during the twentieth century, most of the archaeological information from the period derived from cemeteries (Bognár-Kutzián, 1963, 1972; Patay, 1961, 1974). Only in the last 20 years, there has been a significant increase in the research of settlements (Gyucha, 2015; Parkinson, 2006a; Parkinson *et al.*, 2021; Parkinson & Gyucha, 2007; Raczky *et al.*, 2014; Szilágyi, 2015). There is now a large amount of data available on settlements and settlement patterns, which has helped to shade the previous picture. These data have clearly shown that the cultures of Tiszapolgár and Bodrogkeresztúr cannot be separated from each other in time and space, neither in the settlements nor in the burials (Siklósi *et al.*, 2022; Szilágyi, 2015). It has also become clear that in different social contexts, material culture can appear in different ways. For instance, we find many objects in graves that are different regarding their type, material, and quality from what we find in settlement features (Siklósi *et al.*, 2022, p. 365).

On this basis, it became evident that the use of archaeological culture in the traditional sense does not provide a sufficient explanation for the Tiszapolgár and Bodrogkeresztúr styles that often appear simultaneously in space and time (Siklósi *et al.*, 2022, pp. 351–352). Thus, it is important to examine the archaeological material from a new, additional approach, which – in complementing the typo-morphological classification – studies the individual choices behind each vessel.

The objective of our study is an Early Copper Age sherd that does not seem significant at first glance. It is a fragment of a poorly executed bowl with confused incisions, found in a settlement pit (Figure 1), which stands in stark contrast to the other well-shaped and sometimes richly decorated bowls known from the same site. Although such vessels were found sporadically in other Early Copper Age sites, for example from Rákóczifalva-Bagi-föld Site 8 or Rákóczifalva-Bivaly-tó Site 1/c (M. Szilágyi & E. Solnay, unpublished data) (Figure 2), such ceramic objects have never been subjected to detailed investigations. However, in the context of automatic gestures and deliberate individual decisions that determined pot-making, the study of these vessels is of particular importance and can reveal a great deal about the knowledge, skills, and identity of the potters, as well as about the transfer of knowledge within the community.

Such vessels can be interpreted in many ways. For example, they can be referred to as practising pieces produced during learning (Crown, 2001, 2014; Dorland, 2021; Sofaer & Budden, 2013, p. 119; Striker, Howie, & Williamson, 2017, p. 65) or, as children's toys or pieces made by a child, possibly for practice (Fassoulas, Rossie, & Procopiou, 2020; Fülöp, 2016, pp. 124–126; Gucsi, 2009, p. 454; Gucsi & Szabó, 2018, p. 223; Kreiter, 2007, p. 154; Trias, Rosselló, Molina, & Santacreu, 2015). Moreover, they can be connected with other activities, such as testing a new raw material (Striker *et al.*, 2017, p. 66), or with a technological innovation, such as a new preparation technique (Roux & Courty, 1998, 2005). They are sometimes defined as vessels for special use, whose meaning can only be understood in the context of certain activities (Skibo & Schiffer, 2008, p. 110; Striker *et al.*, 2017, p. 66). However, these interpretations are sometimes applied as generalizations without detailed analysis which can be misleading without examining the pottery making steps and studying the context in which it was made and found.

This study presents a method that can improve the interpretation of such vessels and which can be used in the case of similar research questions independently from the period or the geographical region. The aim of

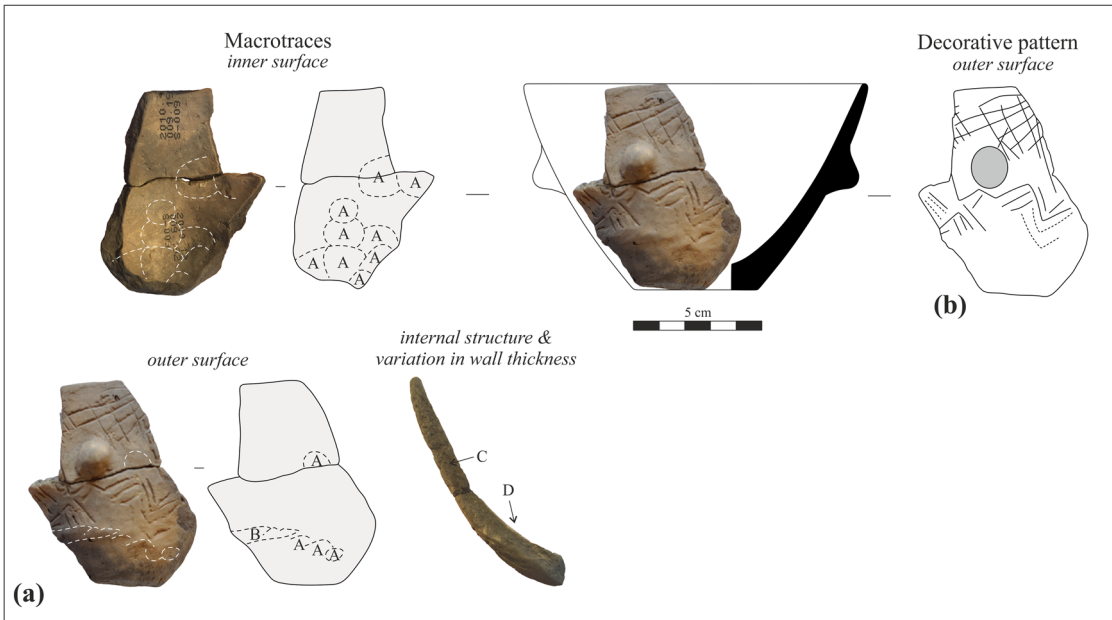


Figure 1: The analysed atypical ceramic vessel: (a) macro-traces of the fabrication process; (A) circular and oval depressions, (B) bulge of clay, (C) homogeneous internal structure, which can be slightly undulating, and (D) crescent-like thickening of the wall of the base and (b) decorative pattern.

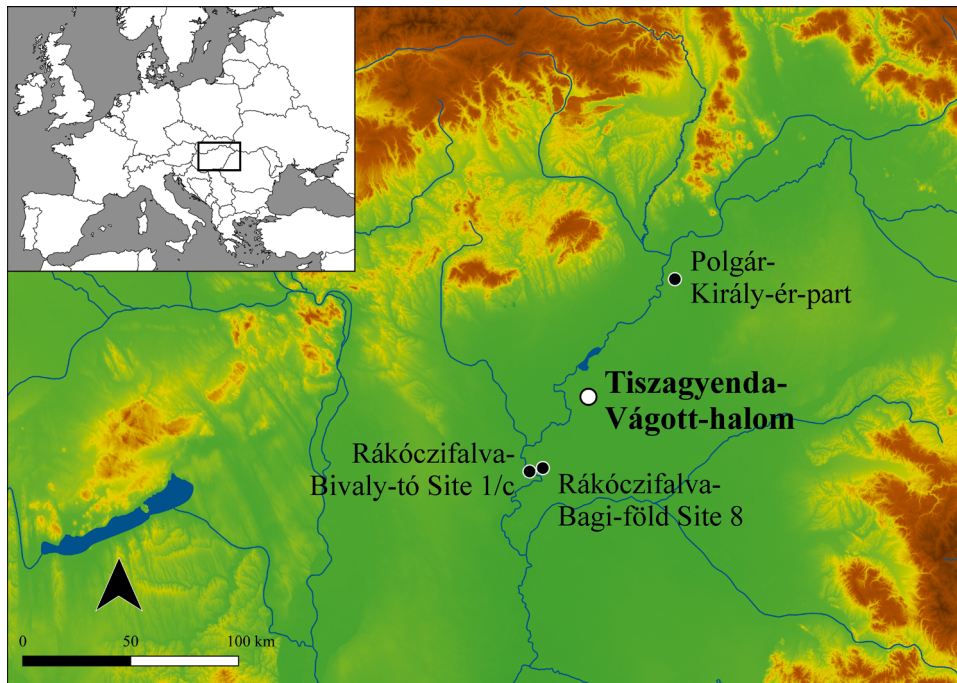


Figure 2: Location of the analysed site and other Early Copper Age sites mentioned in the study.

this study is to detect the circumstances of the production of a specific Early Copper Age vessel through the reconstruction of the biography of its making. The detailed analysis of the *chaîne opératoire* of pottery fabrication allows us to explore the previously described hypothesis (for example as a practising piece or a technological innovation) and to build a strong argument to oppose or support them in the case of this vessel. Furthermore, examining the context of the specific object analysed here will enable us to understand how it

differs from similar ceramic types found at the same site. Although these similar vessels were known from other Early Copper Age sites from the Great Hungarian Plain, the present study is the first to focus on the examination of these objects.

2 Material

The studied vessel was found during the rescue excavations between 2010 and 2011 at the site NKT¹-17, Tiszagyenda-Vágott-halom (Sebők, Szilágyi, & Váczi, 2012). The site is located in the central part of the Great Hungarian Plain, in the Middle Tisza Region (Figure 2), on an elevation next to an old watercourse of the Tisza. The excavations revealed a total of nine burials and four pits dating to the Early Copper Age (Figure 3). The

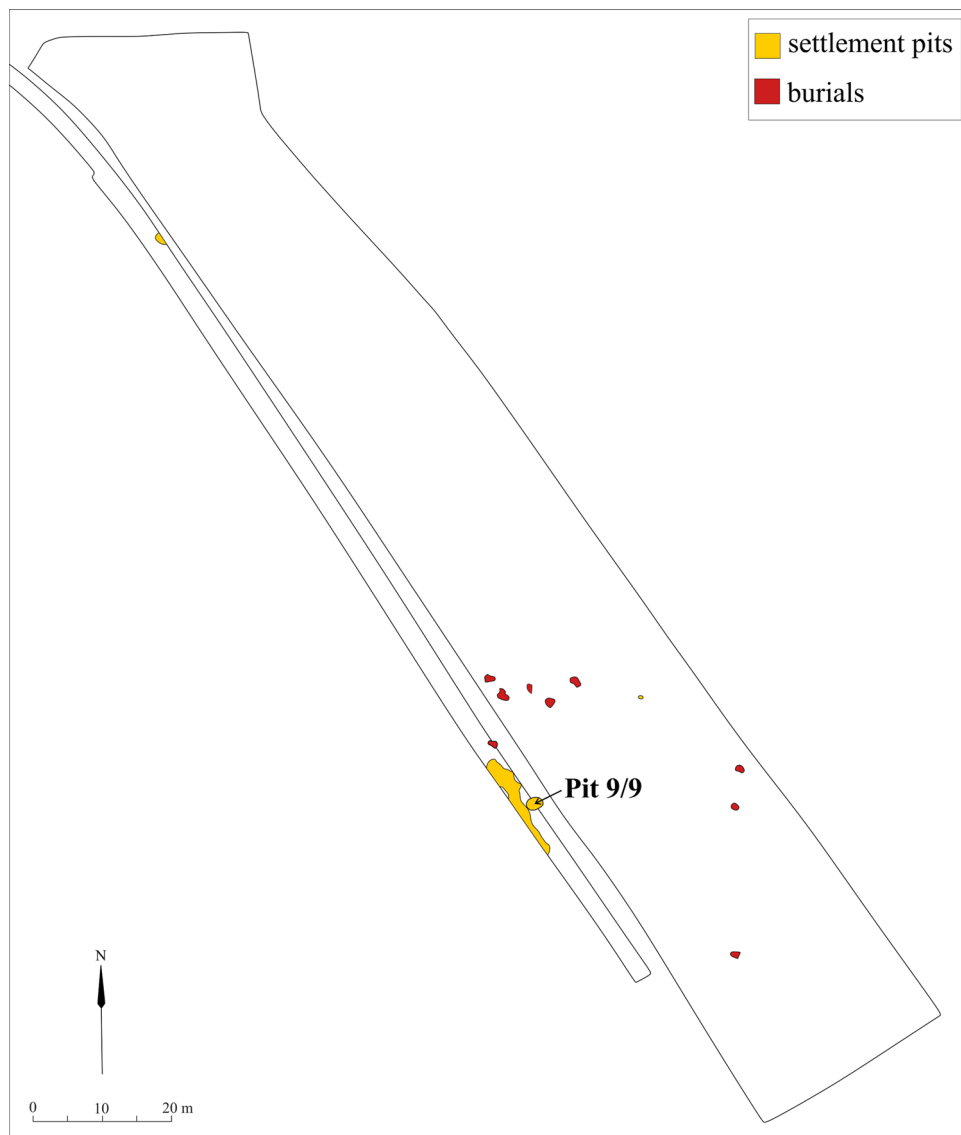


Figure 3: Map of the excavation in Tiszagyenda-Vágott-halom highlighting the pit where the atypical vessel was found.

¹ Hungarian abbreviation for Nagykunság Water Reservoir (Nagykunsági-tározó).

features were distributed in the southern part of the site. Their location suggests that the excavated area did not cover the entire Copper Age site (Solnay, 2022; Szilágyi, 2015, pp. 252–258).

The excavated settlement features were all pits. It is usual to find settlement features and graves near one another, as the custom of settlement burials still existed – see for example Polgár-Király-ér-part (Szilágyi, 2015, p. 130) or Rákóczifalva-Bagi-föld Site 8 (Szilágyi, 2015, pp. 196–197) (Figure 2). The pottery assemblage found in the pits (Table 1) was dominated by bowls, jugs, and flowerpot-shaped vessels (Figures 4 and 5), often with incised, impressed, and dotted decoration (Figure 5d–e).

In the nine graves, the skeletons lay in a contracted position on their right and left sides, which is typical for the period. Eight of the nine burials contained usual Early Copper Age vessels as grave goods (Table 1): “milk jugs”, barrel-shaped vessels, *depas*-cups, various bowl types, pedestalled vessels, and tumblers (Figures 4 and 5). Only a few vessels were decorated exclusively with incised patterns (Figures 4a and 5f).

Although we do not have absolute dates for the site, the composition of the pottery assemblage found in the graves and the settlement pits is very similar to another Early Copper Age site in the Middle Tisza Region, Rákóczifalva-Bivaly-tó Site 1/c (Figure 2), where an Early Copper Age settlement and a cemetery were excavated. The diversity of pottery styles in different contexts is striking in Rákóczifalva 1/c. “Milk jugs”, *depas*-cups, and cylindrical deep bowls occur almost exclusively in the cemetery, whereas the settlement assemblage is dominated by different types of bowls and pedestalled vessels (Siklósi et al., 2022, p. 21, Figure 4). According to the traditional typochronology, the settlement would have been dated to the final phase of the Tiszapolgár culture, or to the transitional phase between the Tiszapolgár and Bodrogkeresztúr cultures, while the cemetery would have been dated to the Bodrogkeresztúr culture, based on the large number of “milk jugs”, gold, and copper objects. However, based on AMS dates and Bayesian modelling, the settlement and cemetery at Rákóczifalva 1/c are almost entirely contemporary (Siklósi et al., 2022; Siklósi & Szilágyi, 2021, p. 21). Although due to the lack of absolute dates, we cannot declare the graves and the pits of Tiszagyenda to be contemporary, the high degree of similarity with Rákóczifalva 1/c suggests that there is no, or only a very little chronological difference between the graves and the settlement.

In order to understand the atypical bowl examined in this study, it was essential to know its context, therefore the entire Early Copper Age pottery assemblage of the site was analysed. At Tiszagyenda, the number of diagnostic vessels varied in terms of the different analytic methods used. Sherds from 706 vessels were found at the site, from which 682 were recovered in the pits and 24 from the graves. A total of 296 vessels were suitable for stylistic analyses (form and decoration) and 64 vessels were suitable for technological investigations among which 23 samples from necked vessels (jars and jugs) and bowls (conical, hemispherical, carinated, and S-profiled bowls) were subjected to thin-section petrographic analysis.

The conical bowl (height: 7.5 cm; base diameter: 4.8 cm; rim diameter: 12.5 cm) with a slightly curved side examined in this study was recovered from pit 9/9. The pit contained a total of 227 sherds, 69 of which were diagnostic² from the stylistic point of view and 38 from the technological point of view, 9 of which were analysed petrographically (Table 1). Of the forms that could be identified, different types of bowls (conical, hemispherical, and S-profiled) dominated the assemblage, and, in addition, tumblers, jars, and barrel-shaped vessels were also found in the pit. Seventeen sherds were decorated with impressions or incisions.

3 Theory and Methods

The *chaîne opératoire* of pottery is a very complex process, which can be divided into major parts, such as fabrication, usage, and deposition. In this study, we will focus on the making of the vessel (Gosselain, 2002; Livingstone Smith, 2010; Orton, Tyers, & Vince, 1993, pp. 113–131; Rice, 1987, p. 115; Roux, 2019; Rye, 1981), since it

² This number includes plastic applications that are not included in Table 1.

Table 1: Summary of the characteristics of different ceramic fabrication steps in every Early Copper Age feature at Tiszagyenda with the number of analysed vessels (ARF = argillaceous rock fragments; RO = roughing-out; PF = preforming)

	Collection and transformation of clay material ($\Sigma = 23$)	Forming ($\Sigma = 64$)	Form ($\Sigma = 149$)	Surface treatment ($\Sigma = 37$)	Decoration ($\Sigma = 37$)	Firing ($\Sigma = 23$)
Pit 3/3	No sample was taken	RO: Coiling technique ($\Sigma = 2$) PF: Shaving ($\Sigma = 1$)	Conical bowl ($\Sigma = 1$), S-profiled bowl ($\Sigma = 1$), beaker ($\Sigma = 1$), pedestal ($\Sigma = 2$)	No characteristic surface treatment technique	Impressed ($\Sigma = 2$), incised ($\Sigma = 2$)	No sample was taken
Pit 9/9	Local clay and tempered with grog/ARF ($\Sigma = 2$) or no added temper ($\Sigma = 7$)	RO: Modelling ($\Sigma = 1$), modelling and coiling technique ($\Sigma = 3$), moulding technique ($\Sigma = 3$), moulding and coiling technique ($\Sigma = 14$), slab technique ($\Sigma = 1$), coiling technique ($\Sigma = 15$), two overlaid slab base ($\Sigma = 1$) PF: Shaving ($\Sigma = 7$) RO: Slab technique ($\Sigma = 1$) Not preformed	Conical bowl ($\Sigma = 9$), hemispherical bowl ($\Sigma = 4$), S-profiled bowl ($\Sigma = 13$), beaker ($\Sigma = 2$), mug ($\Sigma = 1$), dipper ($\Sigma = 1$), jar ($\Sigma = 7$), amphora ($\Sigma = 2$), barrel-shaped vessel ($\Sigma = 4$), and pedestal ($\Sigma = 9$) Conical bowl ($\Sigma = 1$)	Burnishing ($\Sigma = 24$)	Impressed ($\Sigma = 11$), dotted impressed ($\Sigma = 4$), incised ($\Sigma = 2$)	Fired at less than 800–850°C ($\Sigma = 4$), around 800–850°C or slightly more ($\Sigma = 1$), and at higher than 800–850°C ($\Sigma = 4$)
Pit 36/36	No sample was taken	RO: Slab technique ($\Sigma = 1$) Not preformed	Conical bowl ($\Sigma = 1$)	Smoothing ($\Sigma = 2$) No characteristic surface treatment technique	Incised ($\Sigma = 1$)	No sample was taken
Pit 289	No sample was taken	No sample was taken	Conical bowl ($\Sigma = 13$), hemispherical bowl ($\Sigma = 9$), S-profiled bowl ($\Sigma = 7$), beaker ($\Sigma = 2$), mug ($\Sigma = 2$), dipper ($\Sigma = 1$), bowl with wavy rim ($\Sigma = 1$), jar ($\Sigma = 9$), amphora ($\Sigma = 1$), barrel-shaped vessel ($\Sigma = 8$), storage vessel ($\Sigma = 4$), miniature vessel ($\Sigma = 1$), and pedestal ($\Sigma = 9$) Carinated bowl ($\Sigma = 1$), “milk jug” ($\Sigma = 1$), and pedestal ($\Sigma = 1$)	No sample was taken	Impressed ($\Sigma = 3$), dotted impressed ($\Sigma = 2$), incised ($\Sigma = 3$)	No sample was taken
Grave 45/45	No sample was taken	RO: Slab technique ($\Sigma = 1$) and coiling technique ($\Sigma = 1$) PF: Scraping ($\Sigma = 1$)	Carinated bowl ($\Sigma = 1$), “milk jug” ($\Sigma = 1$), and pedestal ($\Sigma = 1$)	Burnishing ($\Sigma = 1$)	Incised ($\Sigma = 2$)	No sample was taken
Grave 258/425	No sample was taken	RO: Coiling technique ($\Sigma = 3$) PF: Shaving ($\Sigma = 2$)	Pedestal ($\Sigma = 2$) and barrel-shaped vessel ($\Sigma = 1$)	Burnishing ($\Sigma = 2$) Smoothing ($\Sigma = 1$)	None	No sample was taken
Grave 258/500	Local clay and tempered with grog/ARF ($\Sigma = 2$)	RO: Modelling & coiling technique ($\Sigma = 2$) Not preformed	Deep bowl ($\Sigma = 1$) and “milk jug” ($\Sigma = 1$)	Burnishing ($\Sigma = 1$)	None	Fired at less than 800–850°C ($\Sigma = 2$)
Grave 302/409	Local clay and tempered with grog/ARF ($\Sigma = 3$)	RO: Moulding technique ($\Sigma = 1$), slab technique ($\Sigma = 1$), and coiling technique ($\Sigma = 1$) PF: Beating technique ($\Sigma = 1$)	Carinated bowl ($\Sigma = 1$), conical bowl ($\Sigma = 1$), and pot with everted rim ($\Sigma = 1$)	Burnishing ($\Sigma = 2$)	Incised ($\Sigma = 2$)	Fired at less than 800–850°C ($\Sigma = 3$)
				Smoothing ($\Sigma = 1$)		

(Continued)

Table 1: Continued

	Collection and transformation of clay material ($\Sigma = 23$)	Forming ($\Sigma = 64$)	Form ($\Sigma = 149$)	Surface treatment ($\Sigma = 37$)	Decoration ($\Sigma = 37$)	Firing ($\Sigma = 23$)
Grave 308/426	Local clay and tempered with grog/ARF ($\Sigma = 4$)	RO: Modelling ($\Sigma = 1$), moulding technique ($\Sigma = 1$), and coiling technique ($\Sigma = 4$) PF: Scraping ($\Sigma = 1$) and beating technique ($\Sigma = 1$)	Hemispherical bowl ($\Sigma = 1$), <i>dépas</i> -cup ($\Sigma = 1$), “milk jug” ($\Sigma = 2$), tumbler ($\Sigma = 1$), barrel-shaped vessel ($\Sigma = 1$)	Burnishing ($\Sigma = 4$)	None	Fired at less than 800–850°C ($\Sigma = 4$)
Grave 311/441	No ceramic grave-good	No ceramic grave-good	No ceramic grave-good	No ceramic grave-good	No ceramic grave-good	No ceramic grave-good
Grave 337/479	Local clay and tempered with grog/ARF ($\Sigma = 1$)	RO: Coiling technique ($\Sigma = 1$) PF: Shaving ($\Sigma = 1$)	Small conical bowl ($\Sigma = 1$)	No characteristic surface treatment technique	None	Fired at less than 800–850°C ($\Sigma = 1$)
Grave 358/510	Local clay and tempered with grog/ARF ($\Sigma = 2$)	RO: Modelling ($\Sigma = 1$), slab technique ($\Sigma = 1$), and coiling technique ($\Sigma = 1$) PF: Shaving ($\Sigma = 1$)	Carinated bowl ($\Sigma = 1$), <i>dépas</i> -cup ($\Sigma = 1$), and “milk jug” ($\Sigma = 1$)	Burnishing ($\Sigma = 1$)	Incised ($\Sigma = 2$)	Fired at less than 800–850°C ($\Sigma = 2$)
Grave 360/513	Local clay and tempered with grog/ARF ($\Sigma = 1$) or no added temper ($\Sigma = 1$)	RO: Slab technique ($\Sigma = 2$) and coiling technique ($\Sigma = 1$) Not preformed	Carinated bowl ($\Sigma = 1$), S-profiled bowl ($\Sigma = 1$), and barrel-shaped vessel ($\Sigma = 1$)	Burnishing ($\Sigma = 2$)	Incised ($\Sigma = 1$)	Fired at less than 800–850°C ($\Sigma = 2$)

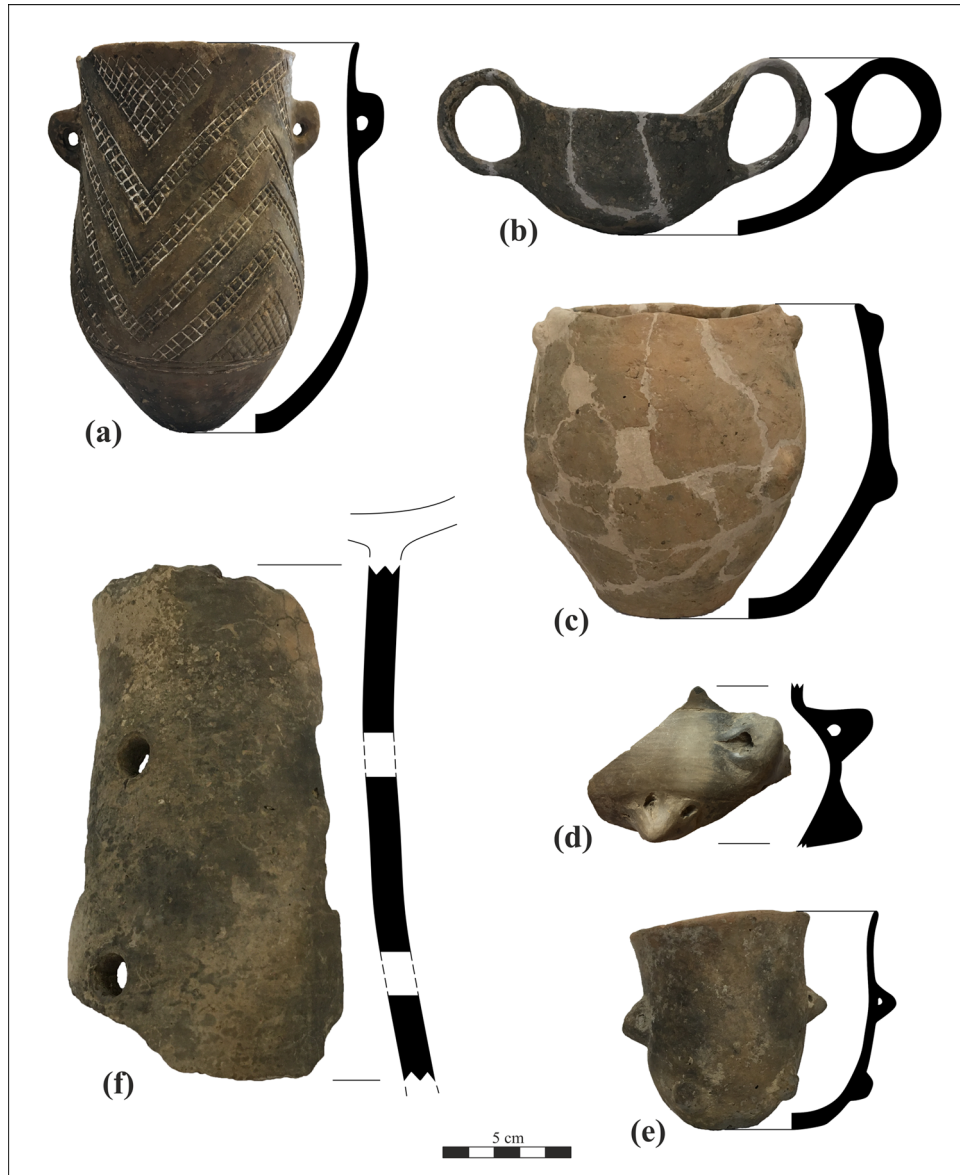


Figure 4: Different main pottery forms from the site: (a) “mik jug” with incised net pattern (grave 45/45), (b) *depas*-cup (grave 308/426), (c) barrel-shaped vessel (grave 308/426), (d) jar (pit 9/9), (e) tumbler (grave 308/426), and (f) pedestal (grave 258/425).

is the most relevant to answer the question raised in the introduction, which is related to the circumstances of making it and the reason for its creation, whereas its actual function is less relevant.

Thus, we study the biography of the vessel through technological and stylistic analyses, without examining many of the subsequent steps, such as use. In the case of the vessel in question, we could not analyse its use since at least 80% of it is missing with most of the possible traces of use. In addition to the making process, we have taken the circumstances of its deposition into consideration, although not studied thoroughly.

During the analysis of ceramic fabrication, we focus on the following steps: (1) preparations, (2) collection and transformation of clay material, (3) forming, (4) surface treatment, (5) decoration, and (6) firing (Figure 6). The drying time before, during, and after these steps is also important (Roux, 2019, p. 110); nevertheless, it was not considered as an individual step in this study. Moreover, post-firing treatment is often regarded as the final step of pottery fabrication when the fired vessel is treated with some kind of organic material, for example, soaked into a liquid, made of plant or animal fats (Diallo, Vanhaelen, &

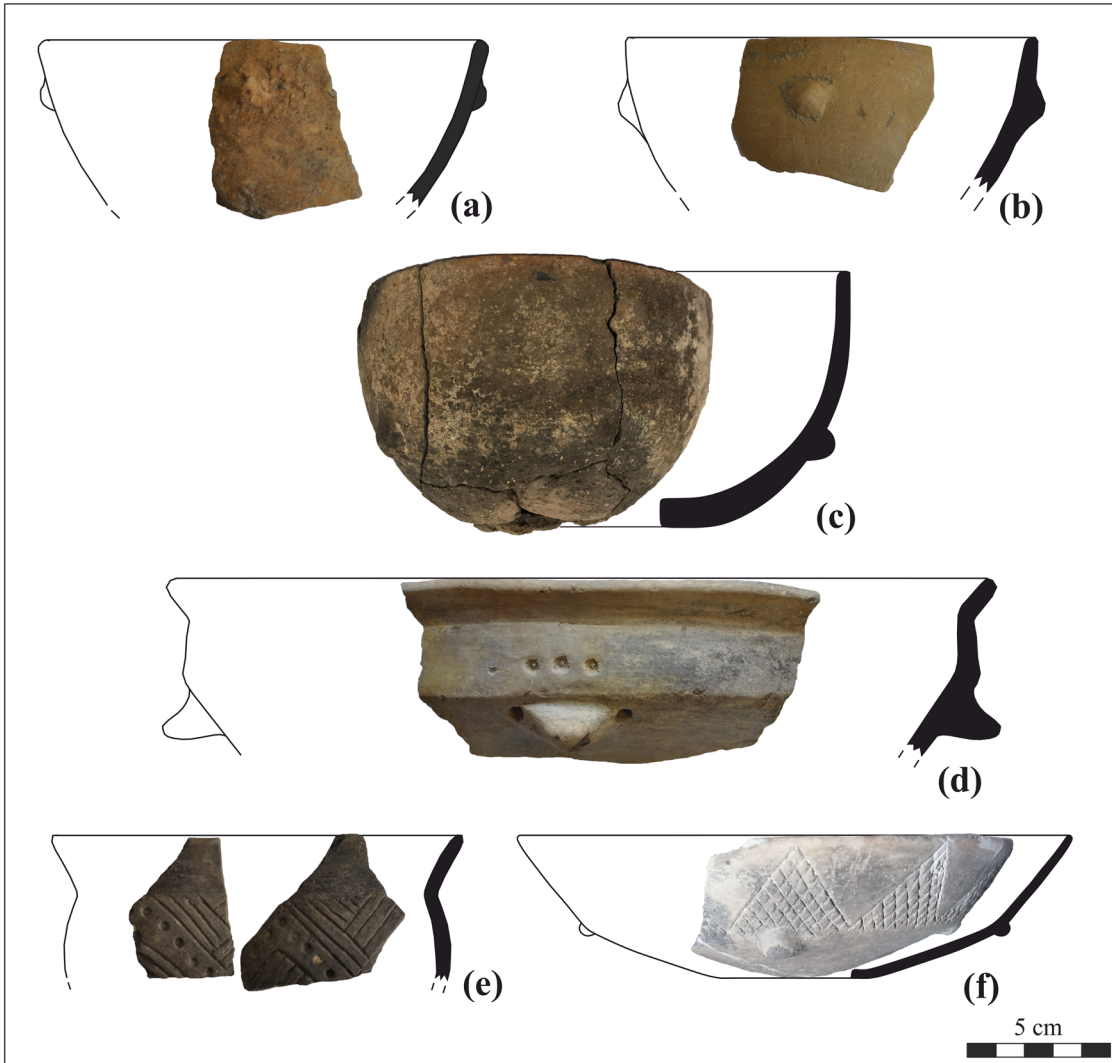


Figure 5: Selection of bowls from Tiszagyenda: (a) conical bowl (pit 289), (b) conical bowl (pit 289), (c) hemispherical bowl (grave 308/426), (d) S-profiled bowl with impressed dots (pit 9/9), (e) S-profiled bowl with a combination of incised lines and impressed dots (pit 289), and (f) carinated bowl with incised net pattern (grave 302/409).

Gosselain, 1995; Gosselain, 2002, pp. 183–198; Livingstone Smith, 2010, p. 12; Longacre, Xia, & Yang, 2000; Rice, 1987, pp. 163–166). This step has been little studied in the case of archaeological vessels (Drieu, 2017; Drieu, Lepère, & Regert, 2020) and cannot often be clearly separated from the usage of the pots (Drieu, 2017, p. 293), neither during the analysis nor by the potters themselves (for example first cooking). Thus, the post-firing treatment of the analysed vessel was not examined in this study.

3.1 Preparations

The first step of making a vessel is planning, which is entirely a mental process. This is the point where it is decided who will make what kind of vessel and for what purpose. The sequence of decisions about the making of the vessel starts before the practical steps, but some parts of the mental and practical stages may overlap. For example, the decision about the decoration of the vessel does not necessarily have to precede the procurement of the raw materials.

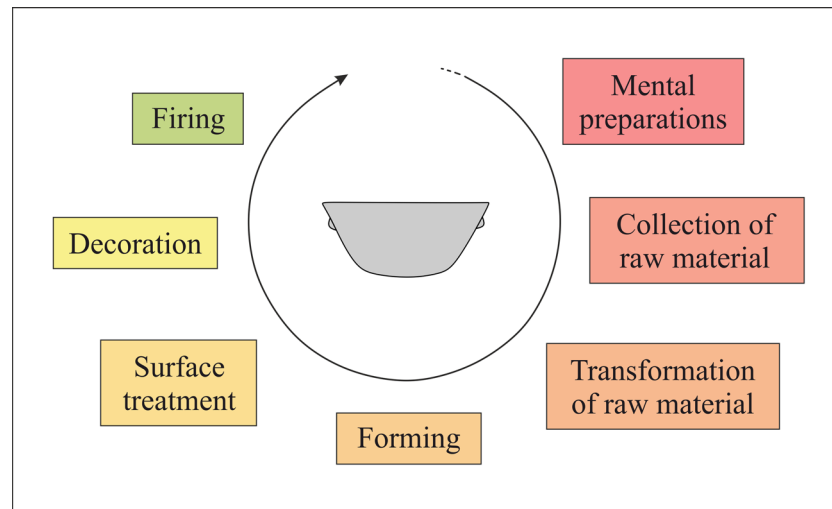


Figure 6: Main steps of the ceramic fabrication process discussed in the article.

The information we have about the decision-making process is both direct and indirect. Direct, because the outcomes of the decisions are concrete, they are there on the vessel. Also, indirect since we can only deduce the available options by comparison. To see what options were available before a vessel was made, we need to know and reconstruct the technical and stylistic repertoire available to the community. An important first step in the process of making a vessel is therefore to create a mental image of the vessel, for which the elements could be selected from the repertoire of community knowledge (Gardner, 2008, p. 95; Lemonnier, 1993, pp. 9–12; Malafouris, 2008; Skibo & Schiffer, 2008, pp. 7–8; Van der Leeuw, 1993; Zeeb-Lanz, 2006, p. 84).

Since this step of the process is non-practical, it can only be reconstructed from the available direct and indirect data after understanding the practical process of the making of the vessel.

3.2 Collection and Transformation of Clay Material

Following the preparation, the first practical step of ceramic fabrication is the collection and transformation of clay material which could be strongly influenced by the distance of the clay source. The clay is often collected near the settlement (Arnold, 1985, p. 24; Gosselain, 2002, p. 40; Gosselain & Livingstone Smith, 2005, p. 39). However, a community can use different clay sources (Gosselain & Livingstone Smith, 2005; Kreiter, Kalicz, Kovács, Siklósi, & Viktorik, 2017, p. 601), which could be related to various factors, such as the properties of clay materials like plasticity, contamination, or colour (Roux, 2019, p. 17; Rye, 1981, p. 17); personal; cultural; or social habits such as personal preferences (Gosselain & Livingstone Smith, 2005, p. 40), control over the clay source (Gosselain, 2002, p. 38), or the sources of raw material which were acquired during the learning process (Gosselain & Livingstone Smith, 2005, p. 42; Wallaert, 2008, p. 118). The collection of the raw material is often one of the most controlled fabrication steps, which can be acquired only at the end of the learning process (Frank, 2001, p. 81; Gosselain, 1999; 2002, p. 566; Gosselain & Livingstone Smith, 2005, p. 40; Wallaert, 2008).

This follows by the transformation of the collected clay into a prepared clay mass when the knowledge and application of proper “recipe” are essential. During this process, the clay is prepared – for example by drying or soaking – to make sure that it has the required inclusion size ranges and to remove contaminations. After this, the clay can be tempered with various raw materials to improve different qualities of the mass. Finally, the paste is generally homogenized by kneading or wedging and is left to mature (Gosselain, 2002, pp. 54–74; Gosselain & Livingstone Smith, 2005; Roux, 2019, pp. 30–40). The potters acquired the correct process of the transformation – i.e. the different elements of the proper “recipe” – during a long learning process. After this, several parts of their

developed habits are difficult to change. Moreover, ceramic tradition frequently embodies stability and temporal continuity, which play a significant role in constructing notions of belonging together. Therefore it is often important for the potters to preserve and transmit it according to the social rules of the community (Gosselain, 2002, p. 46; Gosselain & Livingstone Smith, 2005; Herbich & Dietler, 2008; Roux, 2019, p. 18).

Petrographic analysis was carried out to reconstruct raw material choice and preparation. This allows us to assess the provenance of the raw material, to define the type and quantity of temper, and to describe the nature of clay preparation. During the petrographic analyses, the inclusion density, size categories, inclusion sorting, and roundness of the components were determined following the guidelines of the Prehistoric Ceramic Research Group (PCRG, 2010).

3.3 Forming

The collection and transformation of clay material is followed by forming when the prepared paste is transformed into a shaped vessel. Similar to the transformation of clay, the know-how of forming is also acquired during a long learning process. During this, the learner observes and copies the way-of-doing of the tutor and the required motoric and cognitive skills are internalized, which are difficult to change later (Gelbert, 2003, pp. 53–59; Gosselain, 2002, p. 26; Roux, 2010, p. 6). According to ethnographic and ethnoarchaeological studies, the learning process always takes place in social groups, therefore, the conscious preservation and transmission of forming traditions are also important besides automatism (Giligny, 2015, p. 73; Gomart, 2014a, p. 154; Gosselain & Livingstone Smith, 2005, pp. 41–42; Roux, 2010, p. 6).

Furthermore, forming techniques are often closely related to vessel forms because some forms cannot be shaped, or are very difficult to shape with some forming techniques (Arnold, 1989, p. 31). Thus, this practical aspect can be identified in the sets of long-term technical traditions where some forming techniques can only be detected on one or just a few vessel types (Solnay, 2022, p. 31).

Macroscopic analysis was carried out on surface topography, variation in wall thickness, lines of fractures, and internal structure (Gomart, 2014b, pp. 44–45; Livingstone Smith, 2010, pp. 112–129; Pierret, 1995, p. 59; Roux, 2019, pp. 141–154; Van Doosselaere, 2010, pp. 180–222). The observed diagnostic features allow us to identify forming techniques that can be interpreted with the aid of ethnographic, archaeological, and experimental reference works (Gelbert, 2003, p. 15; Giligny, 2010, p. 21; Gomart, 2014a, p. 146; Smith & Crépeau, 1983; Van Doosselaere, 2010, p. 223).

3.4 Surface Treatment

After forming, the inner or outer surface of the vessel can be transformed before or after firing (Balfet, Fauvet Berthelot, & Monzon, 1989, p. 73; Binder & Courtin, 1994; Lepère, 2014; Roux, 2017; 2019, p. 96; Rye, 1981, p. 24). The aim of the surface treatment can be aesthetical (Lepère, 2014, pp. 144–145; Roux, 2019, p. 96; Rye, 1981, p. 24) and/or practical, for example, improve the vessels' resistance against thermal or mechanic shocks or reduce their permeability (Debels, 2018, pp. 2–3; Lepère, 2014, pp. 144–145; Roux, 2019, p. 96; Rueff, Debels, Vargiolu, Zahouani, & Procopiou, 2021; Schiffer, 1990; Skibo, 1992, p. 23). Therefore, surface treatment can not only be influenced by long-term technical traditions but also fashions or practicality.

Similar to forming, surface treatment was studied macroscopically and interpreted with the help of ethnographic, archaeological, and experimental reference works (Lepère, 2014; Roux, 2017, 2019, p. 195). However, it is important to remark that several techniques are difficult to identify macroscopically due to the absence of characteristic macro-traces that are easily recognizable on archaeological vessels. Besides, the usage, post-burial, or post-excavation processes had a strong impact on the preservation of the traces of surface treatment on the ceramic surfaces. Thus, the macroscopic approach can only be able to describe the characteristic surface treatment techniques or their absence.

3.5 Decoration

The next significant step in the process of making is to decorate the vessels in many ways using different tools (Rice, 1987, p. 244; Roux, 2019, p. 102). The decoration of pottery could not only serve an aesthetic purpose, but its meaning could also play a significant role in representing identity in different social situations (Becker, 2019; Zeeb-Lanz, 2003). Thus, in contrast to many earlier steps of the making, the decoration is the result of a high degree of conscious decisions, which may reflect the ideas, values, or knowledge of an individual or a community (Skibo & Schiffer, 2008, p. 110; Szilágyi, 2015, pp. 62–64).

The incisions were examined macroscopically in a similar way to moulding and surface treatment, in an attempt to determine the order in which the patterns on the bowl were incised.

3.6 Firing

The final, general step of the ceramic fabrication process is firing when the physicochemical traits of the vessel are irreversibly transformed (Gosselain, 1992, 2002, p. 141; Livingstone Smith, 2001; Roux, 2019, p. 110; Rye, 1981, pp. 24–25). In general, several potteries are fired together (Gosselain, 1992, p. 145; Roux, 2019, p. 116; Rye, 1981, pp. 154–155) often in an open fire or in simple structures which do not leave archaeological traces (Thér et al., 2019). In these cases, the general firing temperature varies between 500–600 and 900°C (Gosselain, 1992, p. 240; Roux, 2019, p. 112), but it can be changed during the firing process (Gosselain, 1992; Livingstone Smith, 2001; Maggetti, Neururer, & Ramseyer, 2011; Thér et al., 2019). However, it has to be acknowledged that changes in ceramics during firing are not only influenced by the maximum firing temperature but also by the duration of firing, the thickness of the wall of the vessel, clay types (proportion of clay minerals and their refractoriness), and inclusion types. Therefore, the firing temperature reconstruction should be viewed as an “equivalent firing temperature” (Quinn, 2013, pp. 190–191).

Similar to raw material, firing was studied microscopically during petrographic analysis. This enabled us to define the “equivalent firing temperature” which was assessed by observing thermally induced changes in the clay matrix and non-plastic inclusions in thin sections ($\leq 30 \mu\text{m}$). Thermally induced changes (sintering and vitrification) alter the birefringence of the clay minerals and the “optical activity” of the matrix is reduced (observed by rotating the sample in XP at higher magnifications) and becomes anisotropic and somewhat glassy/blurry. According to the available literature, if the matrix of the ceramic is optically active, it indicates a firing temperature of about 800–850°C or less (Belfiore et al., 2007; Froh, 2004; Maniatis et al., 1984; Maniatis & Tite, 1981; Perry, 2016; Quinn, 2013, p. 191). Higher degrees cause considerable changes in the optical characteristics of the matrix and in the appearance of certain inclusions.

4 Previous Analyses on the Early Copper Age Ceramic Fabrication Process on the Great Hungarian Plain

Early Copper Age ceramic fabrication processes are understudied in Hungary. According to the available ceramic petrographic results on the Early Copper Age Great Hungarian Plain, the clay was extracted around the sites (Duwe, Parsons, Galaty, & Hoekman-Sites, 2021, pp. 248, 251–253; Parsons, 2005, p. 9), although some vessels from non-local clays are known, they also came from clay sources on the Great Hungarian Plain (Duwe et al., 2021, p. 253). However, it is important to remark that the geological map of the Great Hungarian Plain is very homogeneous, thus, the exact location of clay sources is difficult to assess (Duwe et al., 2021, pp. 249–253). The “recipe” of clay preparation was similar on the few analysed sites in the Körös Region, only smaller differences can be observed. The dominant temper was grog in various quantities and size ranges, and the clay

raw materials were to be kneaded to different degrees (Duwe et al., 2021, pp. 246–248; Parsons, 2005, p. 8). The inconsistency in the quantity and quality of temper and homogenization may indicate differences in tradition (Duwe et al., 2021, p. 248), but can also be linked with other factors such as the energy or attention spent on the preparation of the clay.

Regarding ceramic forming, the technological analysis of pottery shaping is a new methodological approach in the analysis of Early Copper Age material on the Great Hungarian Plain. Besides the here examined Tiszagyenda, the preliminary results from another settlement, Polgár-Király-ér-part testify that bottom-up coiling was a common roughing-out (i.e. primary forming) technique there, when the vessels were built from coils of different sizes (Solnay, 2021, pp. 203–205). Another roughing-out technique, moulding also appeared on this site when a compact clay disc was pushed on/in a convex or concave form to take its shape (Solnay, 2021, pp. 207, 209). Besides, preforming (i.e. secondary forming) techniques can also be observed at Polgár-Király-ér-part, for example, scraping when the clay was removed or replaced on the surface of the pottery with a rigid tool (Solnay, 2021, p. 211).

The macroscopic analysis on the surfaces of Early Copper Age vessels from the Great Hungarian Plain frequently shows different types and degrees of regularization. The most widespread technique with characteristic traces in the region is universally called burnishing or polishing (Szilágyi, 2015, p. 268, Figure 122). The definition and separation of burnishing and polishing is a long-debated issue (Lepère, 2014; Martineau, 2010; Roux, 2019). However, the difference between the two techniques has not been studied previously in the case of Early Copper Age materials, and they cannot be clearly distinguished by macroscopic observation at Tiszagyenda. Thus, in this study, a general definition of burnishing is used which consists of rubbing leather-hard or dry clay with a hard, but smooth-surfaced tool – i.e. pebble (Binder & Courtin, 1994, p. 259; Dubreuil et al., 2023; Ionescu et al., 2019, p. 32; 2015; Ionescu & Hoeck, 2020; Roux, 2019, p. 96; Rye, 1981, p. 90). Smoothing also appears to be a frequently applied technique in the region (Szilágyi, 2015, p. 268, Figure 122); however, its macro-traces often disappeared due to the previously explained post-fabrication processes. Therefore, their number is possibly highly underestimated.

One of the most characteristic features of Early Copper Age pottery is the presence of plastic applications on the vessels. The most common plastic decoration found on almost all vessel types is knobs and lugs varying in shape and size and can be perforated, semi-perforated, or non-perforated. Their arrangement is fairly regular, on most vessel types, four pieces appear in a symmetrical arrangement in one or two rows on or below the belly line (Bognár-Kutzián, 1963, pp. 236–294; 1972, pp. 118–149; Szilágyi, 2015, pp. 83–98).

In addition to plastic applications, there are also incised decorations, which could be made using three techniques: impressing, dotted-impressing, or stabbing and incising. While impressed and dotted-impressed ornaments often formed a simple geometric motif that appeared as a single, independent design, incised ornaments often filled the surface of the vessel. Among these, the most common basic motif is a series of triangles running around the body of the vessels, filled in with hatched lines or net patterns. Also common is the geometric decoration, usually zigzag bands, or meanders filled with a net pattern. The basic motifs were often combined with each other, resulting in a rich variety of decorative patterns (Bognár-Kutzián, 1963, pp. 300–305; Szilágyi, 2015, pp. 77–99).

Contrary to the previous fabrication steps, studies on Early Copper Age ceramic firing temperature on the Great Hungarian Plain have never been published before. Thus, this is the first published examination in this field.

5 Results

Following the previously detailed methods, several types of analyses were carried out on the atypical vessel to reconstruct the fabrication process. However, the results can only be interpreted in the light of the whole ceramic material from the site (Table 1).

5.1 Preparations

The mental steps of making a vessel can only be reconstructed after analysing the practical steps of *chaîne opératoire*, based on the available direct and indirect data.

5.2 Collection and Transformation of Clay Material

Petrographic analysis indicates that the clay for this atypical vessel was collected in the vicinity of the site. In the clay mass, the amount of non-plastic inclusions is moderate (approximately 11–14%), mainly medium-sized (0.25–1 mm), although fine (0.1–0.25 mm) and very fine (<0.1 mm) inclusions could also be found (Figure 7a). Petrographic data suggest that the inclusions were well-sorted and evenly distributed in the fabric during the preparation of the clay mass. Mainly monocristalline quartz and sporadically charred plant remains were observed in the paste. However, the occurrence of the latter was probably not purposeful, plant remains could appear naturally in the clay. This source of raw material has also been used for the fabrication of other vessels (such as bowls) and it is similar to different raw materials in the vicinity of the site.

In the Early and Middle Copper Age on the Great Hungarian Plain, the clay was often tempered (Duwe *et al.*, 2021, pp. 246–248; Parsons, 2005, p. 8; Szilágyi, 2015, p. 75). However, contrary to most potteries from Tiszagyenda, no traces of any added tempering material could be identified in the analysed bowl. Other vessels were almost always tempered with grog or dried pieces of clay fragments. Besides this atypical vessel, there is only one untempered vessel in the analysed ceramic assemblage. The other bowls made from the same clay as the atypical vessel were also tempered in every case.

During the raw material preparation, the clay was properly homogenized by kneading or wedging suggested by the homogeneous and well-oriented fabric. This cannot be observed in the other petrographically (in thin sections) analysed vessels (23 pieces) from the site, the fabrics of which were generally not (Figure 7b), or only slightly oriented. This suggests that the raw material of this atypical vessel was better prepared than others.

5.3 Forming

After processing the raw material, the vessel was shaped into a desired form. In the case of the atypical vessel, the achieved form is a conical bowl with a slightly curved side. This bowl type is one of the most common vessel types both in the settlement pits and graves. Moreover, carinated, S-profiled, and hemispherical bowls,

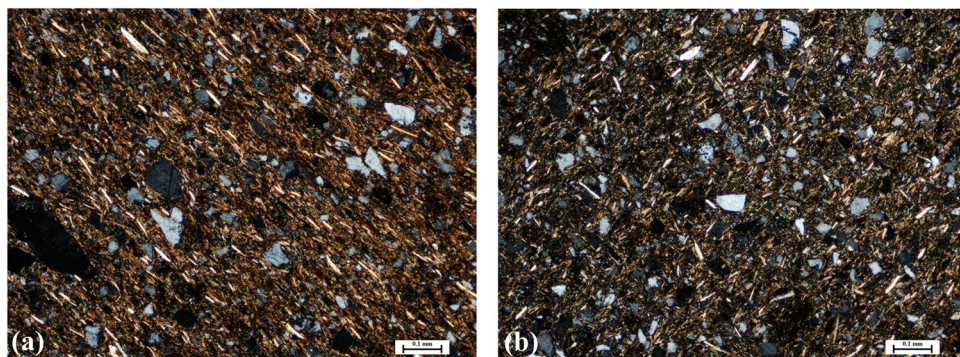


Figure 7: Petrographic analysis: (a) parallel orientation of inclusions in the atypical vessel and (b) characteristic appearance of the matrix (not oriented) in other analysed samples. Both micrographs are 100x, XP.

as well as a bowl with a wavy rim, have also been found on the site. The size of the atypical vessel is not unique, although it belongs to the category of smaller examples.

The vessel was modelled (in other terms, pinched or drawn) during roughing-out with repeated pressing or stretching of the compact clay mass with fingers. This was indicated by the oval depressions on the inner and outer surfaces (and occasionally with bulges of clay on the uneven surface), as well as the crescent-like thickening of the wall of the base and the homogeneous internal structure, which can be slightly undulating at the depressions (Figure 1a). This forming technique is unique compared to the roughing-out techniques of other bowls from the site. At Tiszagyenda, several pottery forms had their own tradition of shaping. The bowls were generally formed with the moulding technique (with or without coils forming the rim) (Figure 8a) or occasionally slab technique – the latter describes the technique when numerous small slabs were pushed in/on a convex or concave mould to take its shape (Figure 8b) (Solnay, 2022, p. 29). Moulded and modelled vessels are both made from one compact clay mass, which raises the question of separating the two techniques in the analysed assemblage. At Tiszagyenda, oval or longitudinal depressions are absent from the surfaces, the wall thickness is uniform, occasionally thinned at the base (not thickened, like in the case of this vessel), the lines of fractures can be central, radial, from the base towards the rim, and the internal structure was generally very homogeneous (Solnay, 2022, pp. 27–28). Thus, the difference in macro-traces in this assemblage supports the idea that the analysed vessel was not shaped with the same technique as the other bowls.

Following the roughing-out, the vessel was not preformed. The absence of characteristic preforming techniques (such as scraping) was a common phenomenon on the site; however, a quarter of the potteries – including numerous bowls – were preformed with scraping (Figure 9a) and shaving (Figure 9b). In the latter case, the clay on the surface is removed with a smooth tool rather than a coarse one, or beating technique (in other words the paddle and anvil technique, when the wall of the vessel is beaten with a paddle).

5.4 Surface Treatment

Characteristic macro-traces cannot be identified by macroscopic observation of the vessel surface. Although definitive macro-traces of smoothing cannot be found, the fine inner and outer surfaces suggest fine smoothing after forming. The characteristic traces of smoothing – such as fine shallow parallel strias – were identified only on four pots from the site (Figure 9c), but their number might be underestimated. Contrarily, burnishing – often with thin shallow strias and frequently shining surface – can be detected on 37 vessels from the site (Figure 9d). However, the bowls were generally polished or burnished in much higher proportion than other ceramic forms.

5.5 Decoration

Both plastic and incised decorations could be observed on analysed bowl. The small, rounded, unperforated knob in the centre of the vessel profile is not unusual, and similar plastic decoration was observed on several other vessels at the site (Figure 5a–c and f). The incised decoration, at first glance, appears to be a tangle of roughly incised lines covering the entire surface of the vessel.

However, when examined closely, the incised lines can be divided into two parts, above and below the line of the knob. Above, there are perpendicular lines forming a rough net pattern, which, based on the remaining fragment, is presumably forming triangles. A zigzag line runs along the bottom of the vessel, accompanied on either side by shorter parallel or perpendicular lines (Figure 1b and for the reconstruction see Figure 10f). Both the lower and upper motifs could be observed on the bowls found at the site, but in each case, in a much more regular arrangement and better execution (Figure 5e–f).

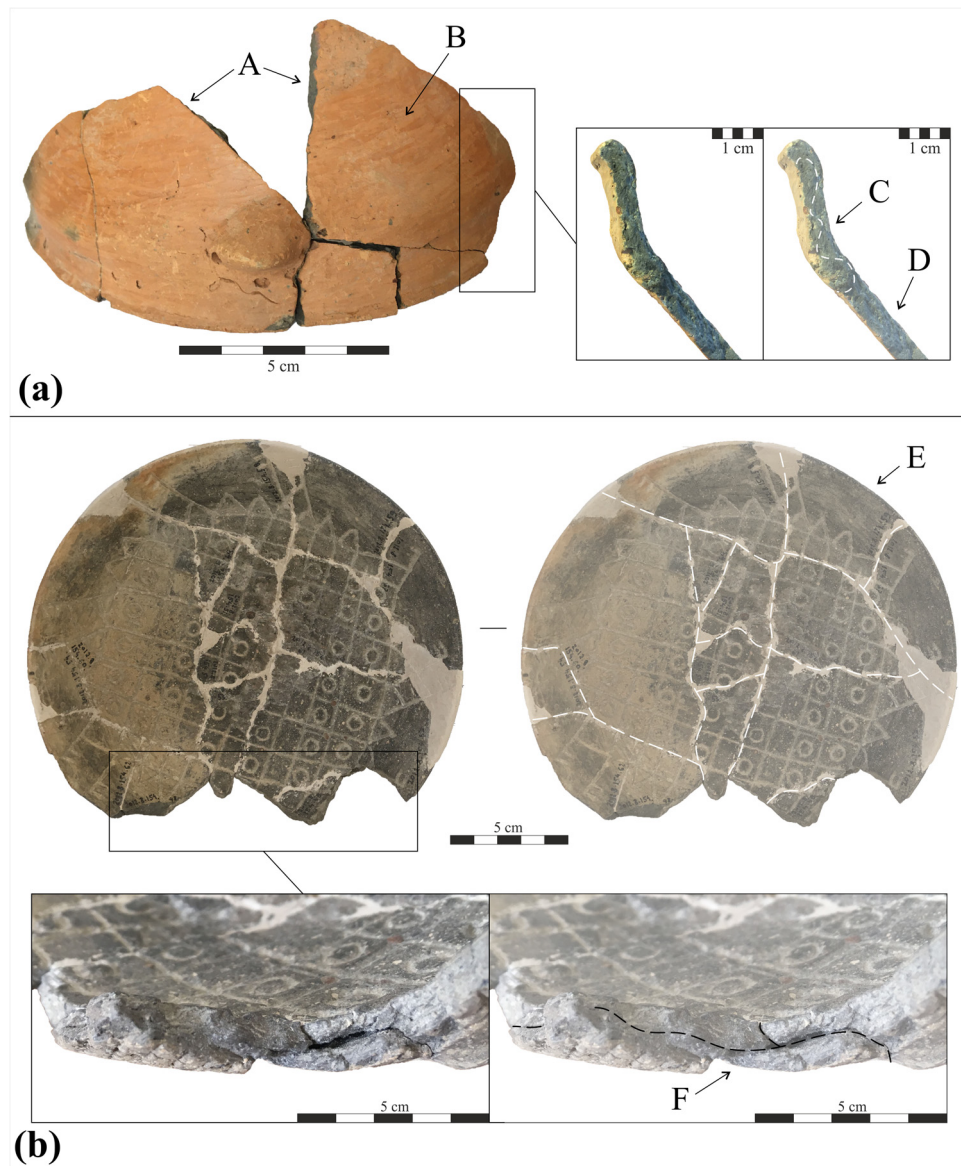


Figure 8: Two basic roughing-out technique of bowls: (a) Moulding technique (with coils forming the rim) and (b) slab technique. Macro-traces: (A) Central fractures from the rim to the base, (B) homogeneous surface, (C) S-Z-shaped internal configuration of the rim (coils), (D) homogeneous internal structure of the body, (E) numerous small, irregular fractures, and (F) small linear and oblique fissures on the internal surface.

In some parts, the chronology of the drawing could be observed based on the intersecting lines (Figure 10a–c). Some lines have been covered again with clay after the incision as if to correct them (Figure 10d: dashed lines). In addition, some of the lines have not been erased, but because of their position, they are probably not part of the motif (Figure 10a).

5.6 Firing

The petrographic analysis suggests that the “equivalent firing temperature” of the vessel was below 800–850°C because its matrix was optically active, and no particular alteration of inclusions was observed. This shows similarity to most of the studied ceramic samples, only a few indicated 800–850°C “equivalent firing temperature” or higher.

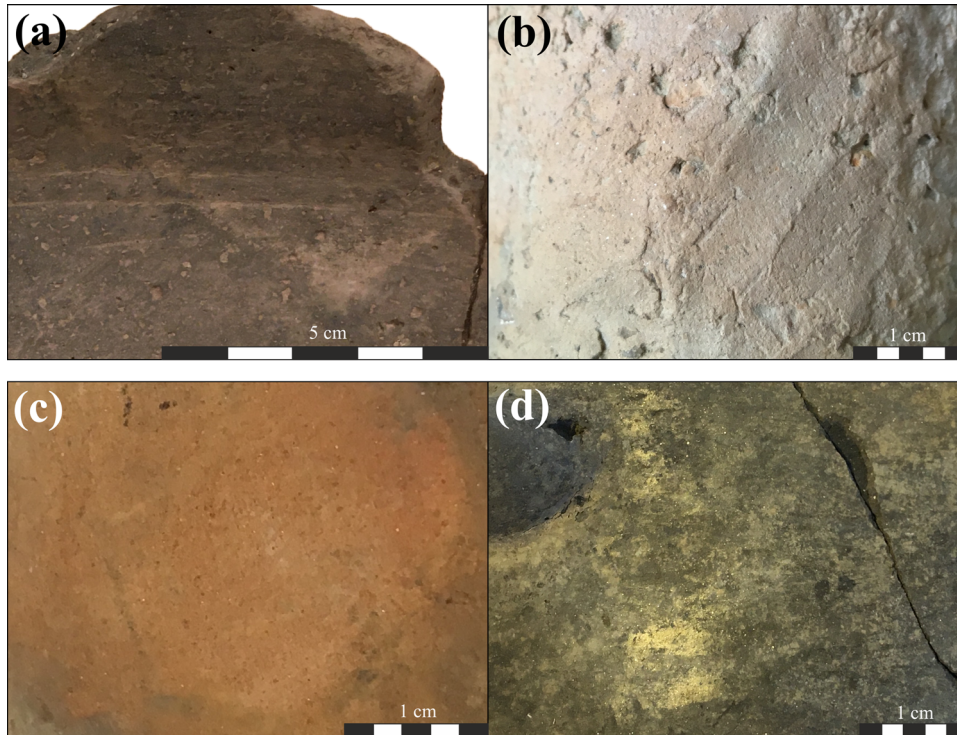


Figure 9: Characteristic surface treatment techniques at the site: (a) scraping (grave 45/45), (b) shaving (grave 337/479), (c) smoothing (pit 9/9), and (d) burnishing (pit 9/9).

6 Discussion

As a result of the technological and stylistic studies, the biography of the making of this atypical vessel was reconstructed (Figure 11), which differs in some respects and corresponds in others to the making of other bowls found at the site (Table 1).

The clay may have been collected from a source close to the settlement and used by other potters as well. As opposed to the common “potting recipe” at the site, the atypical vessel was not tempered during preparation. The inclusions were well-sorted, and the clay was very well-prepared. One possible explanation is that, this bowl might be the evidence of the appearance of another tradition (i.e. paste preparation “recipe”) on the site, which presumes a non-local potter who worked on the settlement using local clay. However, this scenario seems unlikely since no other pot with similarly prepared raw material was found at Tiszagyenda. If a non-local potter stayed and produced vessels on the settlement, more such vessels would be expected. Another more likely explanation is that the individual who made the atypical vessel had not yet mastered all the steps of raw material preparation (such as tempering), and it is even possible that he or she was not involved in the collection of the raw material. Indeed, this is often one of the most regulated aspects of pottery making, and often only skilled potters are allowed to participate in this process (Frank, 2001, p. 81; Gosselain, 1999; 2002, p. 566; Gosselain & Livingstone Smith, 2005, p. 40; Wallaert, 2008). Such a degree of paste preparation indicates a high level of effort and attention, which could have been carried out by both a skilled and a less skilled potter. The latter might have invested more attention in the preparation of the paste during the learning process to achieve such an oriented clay paste.

When creating the mental image of the vessel, the potter was clearly trying to reconstruct a bowl type that was prominent in the repertoire of community knowledge. However, the roughing-out through modelling, and the complete absence of preforming, contrasts sharply with other bowl types. Modelling is considered to be one of the most basic methods of pottery making (Crown, 2001, p. 462; Gosselain, 2002, p. 86; Livingstone Smith, 2010, pp. 101–102). According to ethnographic observations, this can be used by skilled, mainly adult potters to

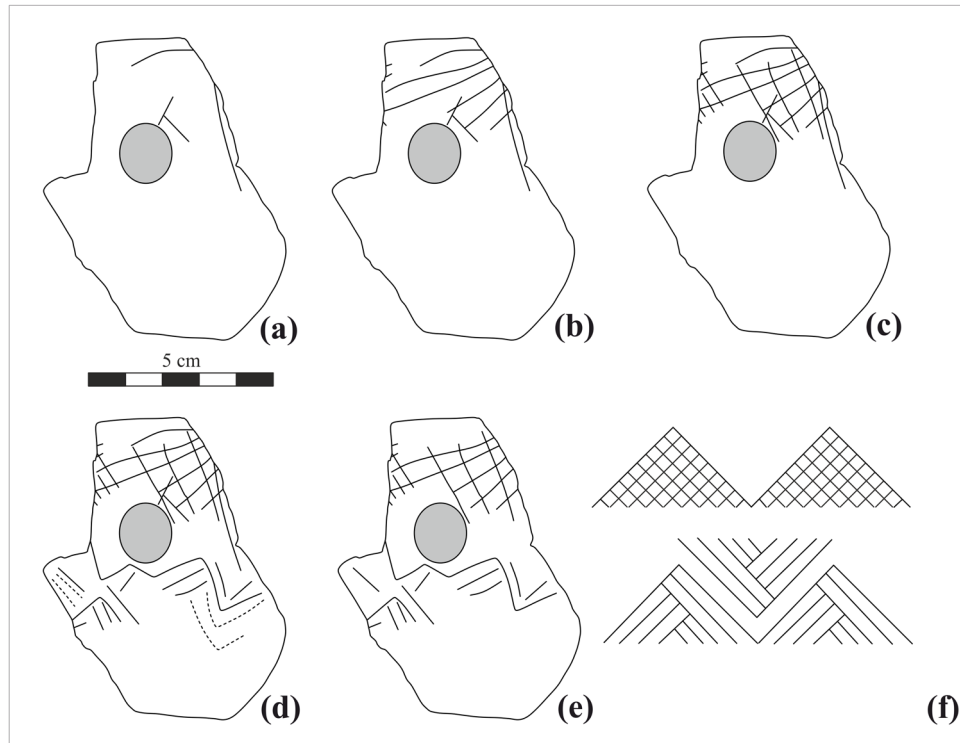


Figure 10: Reconstructions of the making of the incised decoration: (a) first set of incisions: sketch lines, (b) second set of incisions: first stage of the upper motif, (c) third set of incisions: second stage of the upper motif, (d) all lines of the finished decoration, (e) finished decoration without sketch lines and erased lines, and (f) possible reconstruction of the decorative motifs.

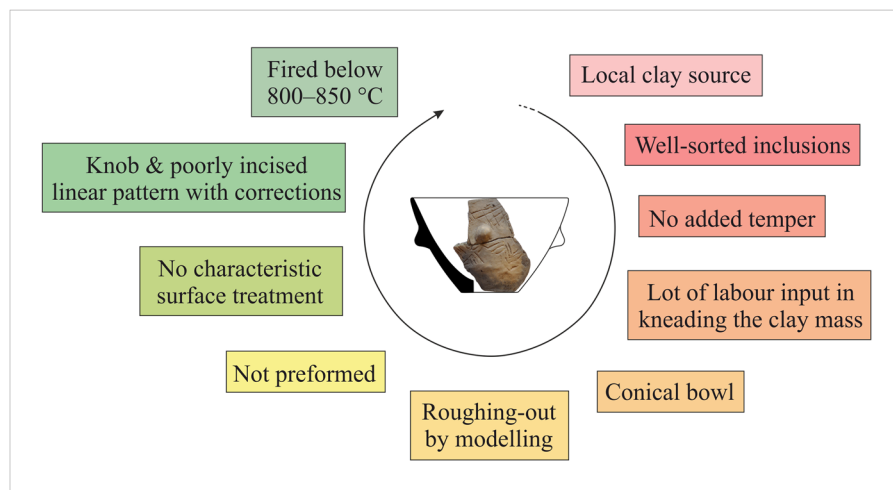


Figure 11: Main steps of the ceramic fabrication process of the atypical vessel.

create smaller vessels (Gosselain, 2002, p. 86; Roux, 2019, p. 60; Rye, 1981, p. 70) or children who were learning pottery production through making small, uncomplicated pots by modelling in the early stages of learning (Crown, 2001, 2014). The latter indicates that the producer of these vessels did not yet possess the technical knowledge and/or skills that are necessary to make bowls. In these studies, adults and skilled potters rarely shaped pots using this technique (Crown, 2001, p. 454; 2014, p. 75).

Fine smoothing and the absence of surface treatment that leaves characteristic traces (such as burnishing) occur at the site but are rare in the case of bowls. This may also indicate low level of skills of the potter who

made the atypical vessel but can also be explained by other factors, such as a different function or a matter of taste.

When making the plastic and incised ornaments, the potter was most probably working from already existing patterns, and based on the knowledge available, created a mental image of the decorative motif. The arrangement of the knob is consistent with the known patterns from the site (and from the Great Hungarian Plain), but the incised ornaments in all other cases show a higher quality and a regular arrangement. Both incised motifs – the net pattern on the upper part and the zigzag line and its accompanying lines on the lower part – are present on other bowls recovered from the site, but these two are never combined on the same vessel. This phenomenon can perhaps be explained by the fact that the basic motifs of Early Copper Age decorative motifs are fixed, but they can be combined with each other in a very free and varied way. The various combinations of decorative elements suggest that the own creativity of the potters also played a major role in the final motifs. The corrected lines filled in with clay and the deviation from the sketch reflect the potter's lack of practice, for which there are numerous archaeological and ethnographic examples (Crown, 2001, 2014; Dorland, 2021; Sofaer & Budden, 2013; Wallaert, 2008). At the same time, the irregular design of the decoration can also be applied to a vessel intended for a specific activity (Skibo & Schiffer, 2008, p. 110; Striker et al., 2017, p. 66), in which the appearance of the vessel and the incised motifs was regulated. An example of this can be seen at Rákóczifalva-Bivaly-tó Site 1/c, where a number of potteries with confused decorations were found among the grave goods (Siklósi et al., 2022, p. 9). However, this possibility is contradicted by the find context, as the fragment under study was recovered from a settlement pit.

At the end of the fabrication process, the pot was fired at an “equivalent firing temperature” of 800–850°C similar to most of the pottery at the site. However, it can be assumed that several pots may have been fired simultaneously (Gosselain, 1992, p. 145; Roux, 2019, p. 116; Rye, 1981, pp. 154–155), so this is not necessarily related to the skill of the potter or the purpose for which the pot was made. In addition, it has been observed in ethnographical examples that practising pots, usually made by children, were also fired (Crown, 2014, p. 78; Wallaert, 2008, p. 190), so this is not a crucial aspect when studying the reason for the creation of the pot.

Although several different explanations were considered, the overall analysis of the *chaîne opératoire* of pottery making suggests that the atypical vessel examined in this study was probably a practising piece produced during learning, with traces of the learning process at almost every stage of the production of this vessel. The potter probably did not yet possess the complete pottery-making tradition of the community. The decoration suggests that, despite the poor quality of the execution, he or she was fully aware of the basic rules of pot decoration. Knowing these rules at an early stage was therefore an important part of the learning process, and it can be assumed that the underlying symbolism was also acquired at an early stage. However, the motoric and cognitive skills needed to carry out the preparation steps correctly were not yet acquired. It would be too early to determine the age of the potter, although learning to form pottery often takes place in early childhood (Crown, 2014, pp. 75–77; Gosselain, 2002, p. 24; Silva, 2008, p. 234; Wallaert, 2008, pp. 188–192), adolescent or adult learning cannot be excluded (Gosselain, 2002, p. 24; Herbich & Dietler, 2008; Wayessa, 2011, p. 308).

At the same time, other explanations known from the research could be ruled out. Presumably, the vessel was not merely used to test the raw material, it was decorated after shaping – albeit in low quality – and the potter also tried to improve the motif, which suggests the importance of the decorative pattern. It is also unlikely for this vessel to have been a practising or test piece produced by adopting an innovation, as the modelling used in roughing-out is one of the simplest methods of shaping (Crown, 2001, p. 462; Gosselain, 2002, p. 86; Livingstone Smith, 2010, pp. 101–102), which was mainly used on simpler, smaller vessels. Moreover, modelling was not part of the dominant bowl forming tradition neither at Tiszagyenda nor at other Early Copper Age sites (Solnay, 2021, 2022). Furthermore, the children's toy function cannot be proven in the case of the present vessel due to the lack of information on the age of the potter. It is probably not just a spoilt vessel, although the decoration is very confused. The pot was not tempered, which is very different from the traditions observed at the site and was made using an atypical technique. This suggests that the potter was aware of the difference in forming technology and did not attempt to reconstruct the usual shaping techniques. Finally, it is also a possibility that the pot was made in a hurry by an otherwise skilled

potter solely for a specific activity. However, this is unlikely for several reasons. First, the well-sorted components and the high degree of processing of the paste of the pottery require a large investment of time and energy, which was not identifiable on any other vessels. Second, this atypical vessel was deposited in a pit with other pot fragments, where there was no evidence of any particular activity, while no similar vessel is known from any of the burials at the site.

7 Conclusion

In this study, technological and stylistic analyses were carried out to reconstruct the making of an atypical vessel found in an Early Copper Age site at Tiszagyenda-Vágott-halom (Eastern Hungary). The results were interpreted in the light of the entire pottery assemblage of the site in order to understand the circumstances of its creation and the reasons for its deviation.

The Early Copper Age atypical bowl from Tiszagyenda was probably a practising piece created during the learning process. This is suggested by the many unique features of the making of the vessel that were in contrast with the pottery fabrication and stylistic traditions of the site, especially in the case of the bowls. The unique elements in the production biography of this vessel are, for example, the absence of tempering material, the roughing-out by modelling, the absence of characteristic preforming and surface treatment techniques, and the making of the incised decoration.

This study presents a method that focuses on the micro-histories and the individual choices behind each object. This approach is of particular importance in studying the Early Copper Age Great Hungarian Plain, where the use of archaeological cultures in the traditional sense had to be reviewed and replaced by bottom-up approach that builds from small-scaled histories and individual narratives (Siklósi *et al.*, 2022). This enables us to understand, among other things, the intentions and skills of the potters who made the vessels and the process of communal knowledge transfer. Thus, this Copper Age case study demonstrates the effectiveness of the approach of pottery biography to explore the embedded cultural values and representations, a part of *habitus*, and deliberate individual decisions, as well as expressions behind the vessels that provide valuable information about past practices.

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