

## RESEARCH ARTICLE – VÝZKUMNÝ ČLÁNEK

## House unit of the Linear Pottery culture? Fill structure and pottery style analysis at the Bylany settlement

Stavební komplex v kultuře s lineární keramikou?  
Analýza struktury výplně a keramického stylu na sídlišti Bylany

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*The aim of the article is to critically evaluate the existing approach toward the Linear Pottery culture (LBK) settlement space in terms of the character of the pits, their fill and pottery decoration style. It is traditionally and implicitly assumed that the pits in the vicinity of a house (so-called house unit) are of the same period of formation, filling, and demise, so their testimony is usually considered comparable. However, research into the formative processes of ceramic material from pits with a spatial association to the house no. 88 in Bylany near Kutná Hora (CZ) shows that individual features differ significantly in terms of structure, and each in its own way is taphonomically unique. At the same time, formative processes have a strong influence on our current perception of the decorative style of Neolithic pottery and its relative chronology. The house unit thus becomes an optimistic assumption in the case of multiphase settlements, which cannot be applied without a better understanding of archaeological sources.*

Linear Pottery culture – Bohemia – formation processes – decoration style – house unit

*Cílem článku je kriticky zhodnotit stávající koncepci studia sídlišť kultury s lineární keramikou (LBK), a to z pohledu charakteru zahloubených objektů, jejich výplně a výzdobného stylu keramiky. Implicitně bývá předpokládána stejná doba vzniku, zaplnění a zániku jam v okolí jednoho domu (tzv. stavebního komplexu), takže jejich výpověď bývá považována za srovnatelnou. Článek analyzuje formativní procesy keramického materiálu z jam s prostorovou vazbou na dům č. 88 v Bylanech u Kutné Hory. Výsledky ukazují, že jednotlivé objekty se výrazně strukturálně liší a každý je svým způsobem tafonomicky unikátní. Formativní procesy zároveň výrazně ovlivňují naše současné vnímání výzdobného stylu neolitické keramiky a tím i její relativní chronologii. Stavební komplex se tak v případě vícefázových sídlišť stává optimistickou premisou, kterou nelze bez lepšího pochopení konkrétní pramenné základny používat.*

kultura s lineární keramikou – Čechy – formativní procesy – výzdobný styl – stavební komplex

### Introduction

Settlements are the most common source for the study of the Neolithic throughout Central Europe. Especially in the case of the Linear Pottery culture (Linearbandkeramik, LBK, 5500/5400–4900 BC), we observe similar patterns of settlements over a wide area of the European Temperate Zone. However, the study of these settlements entails several methodological and conceptual problems that prevent us from fully understanding the context of Neolithic domestic space (Furholt *et al.* 2020). Thus, despite a large number of excavated sites and ground plans of individual houses, we are still unable to answer basic questions concerning the size of settlements, the appearance of the longhouse, and/or the general

number of inhabitants (Rück 2009). In addition to the ground plans of longhouses, the remains of LBK settlements consist of a number of pits that contain most of the excavated artefacts and ecofacts. It is the character of these pits and their conceptual grasp that will be the focus of this article.

Historically, the first large-scale excavation of an LBK settlement took place in Köln-Lindenthal, where the idea of a residential function of sunken features was presented. In contrast, the layouts of long columned buildings were associated with a storage function (Buttler – Haberey 1936). However, this concept was reconsidered in the following years, resulting in the still-accepted hypothesis of residential longhouses surrounded by pits (Soudský 1962; Soudský – Pavlů 1972). In addition, there have been attempts to understand the relationship between longhouses and surrounding pits. Thus, the concept of a house unit – a longhouse and a group of pits that surround it – was developed. These pits were intended to play a primary role as a source of building material for the house and secondarily to be filled with waste produced by inhabitants (Soudský 1966; Modderman 1970; Soudský – Pavlů 1972; Gomart et al. 2015). The house unit thus became an entity that was perceived as chronologically homogeneous and the material from the individual pits was considered comparable. As such, the house unit model played a pivotal role in the development of LBK chronologies (Pavlů et al. 1986; Lüning 1995; Denaire – Lefranc 2018). This model also leads to the idea that the material from the house unit mirrors the daily activities of the house inhabitants or their identity (Pavlů et al. 1986; Pavlů 2011; 2014; Hachem – Hamon 2014; Gomart et al. 2015). A similar principle applies to the so-called *Hofplatz-model*, which assumes that these activities are manifested primarily in features within a 25-metre radius around each house (Boelicke et al. 1988; Denaire – Lefranc 2018). This has been recently criticised and altered by the *row model* or later by the *orthogonal model* of longhouse orientation (Rück 2009; Denaire – Lefranc 2018).

Previously, a number of studies were conducted on the mechanism by which features were filled and LBK waste management (Rulf 1997; Stäuble 1997; Last 1998; Květina 2005; 2010; Domboroczki 2009; Allard et al. 2013; Stäuble 2013; Petrasch – Stäuble 2016; Vondrovský 2021). Despite the heterogeneous nature of the fills at individual sites and the minimal amount of directly deposited waste is often stated, many studies have clung to the idea of waste representing the given community and a short time horizon (Rulf 1997; Last 1998; Allard et al. 2013). This notion is supported, for example, by the distance between houses and the minimal superposition of features that would increase the possibility of the presence of intrusions. The chronological homogeneity of material and the refitting of pottery or lithics is often cited as further evidence for a chronological homogeneity features belonging to the same house unit (Allard et al. 2013; Gomart et al. 2015; although this fact varies from site to site: Stäuble 1997, 84; Domboroczki 2009, 83). On the other hand, some authors point to the possible presence of residual waste and the generally longer taphonomic trajectory of certain artefacts deposited in the pits, which undermines the interpretations described above (Stäuble 1997; Domboroczki 2009, 81; Květina 2010; Vondrovský 2021).

The pace and rate of filling process is also debated. The reliability of the house unit concept is supported by the model of rapid filling of features (within five years), which has been inferred from the quantity of ceramic vessels, osteological material and stone tools (Allard et al. 2013, 14–20). Otherwise, the possibility of filling the features in the period after the demise of the house is discussed (Stäuble 1997; Květina 2010). Although

the aforementioned studies usually focus on specific sites and do not aspire to characterize the universal management of waste in LBK settlements, the concept of the house unit still mostly remains an implicit assumption.

The whole understanding of the chronological development of the LBK in Bohemia is currently based on the concept of the house unit. In the middle of the 20th century, when the research was based only on empirical observations (*Jíra 1910; Axamit 1929; Soudský 1954; Neustupný 1956*), there was a need to create systematic research that would address the chronology of the LBK on a large, long-term inhabited site. To this end, a large-scale excavation was undertaken at Bylany near Kutná Hora over 12 seasons, which uncovered the remains of 147 longhouses (*Pavlů – Zápotocká 1983; Květina – Končelová 2014*). The house unit was then chosen as the fundamental framework of the emerging chronology (*Soudský 1962; Pavlů 1977*). However, the selection of associated features in a densely built-up area was not straightforward; although it relied on direct and indirect stratigraphy, it was largely the result of subjective judgment (*Pavlů 1977, 19–21*). Individual chronological horizons were then defined by the ratio of decorative styles in each complex and the material in the complexes was seen as a random selection of the material culture used in the houses (*Pavlů 1977, 28*).

The objective of this paper is to compare this chronological system and its assumptions with analysis of formative processes. Thus, the artefacts excavated from a group of sunken features spatially related to house 88 in the Bylany settlement was investigated (*Květina – Pavlů 2007*). Database on the results, the following questions were addressed: are the individual features of the hypothetical house unit structurally similar and comparable? What were the dynamics of their fill formation? Could residual waste have entered the fill of the features? And what impact might the findings have on the existing chronology or perception of the decorative style?

## Material and method

Bylany settlement site was chosen for analysis. Having undergone intensive investigation between 1955 and 1976, Bylany represents one of the largest LBK settlements ever being excavated (*Pavlů – Zápotocká 1983*). During this period, 147 Neolithic house plans, representing almost the entire development of the LBK in Bohemia, were investigated over an area of approximately 7 ha (*Pavlů 2000, 270*). For this reason, Bylany served as the basis for the development of the current relative chronology (*Pavlů et al. 1986*). However, the high density of settlement structures accumulated over a long period also makes the situation less clear, which is manifested, for example, in the more frequent occurrence of intrusions and structures in superposition (compared to most LBK settlements). Therefore, in the case of Bylany, dealing with formative processes is more crucial issue than at sites occupied for a short period.

A group of features with a spatial relation to house no. 88 was chosen for the analysis (*Fig. 1*). The selection of house 88 is related to the fact that this particular house unit has been cited in earlier works as a typical example of a LBK building complex (*Soudský – Pavlů 1972, 318; Květina – Končelová 2011, 198*). Previously, selected objects were considered part of the house unit and were used for dating the house (although the definition of this particular unit has changed over time, see *Pavlů – Zápotocká 1983; Pavlů et al.*

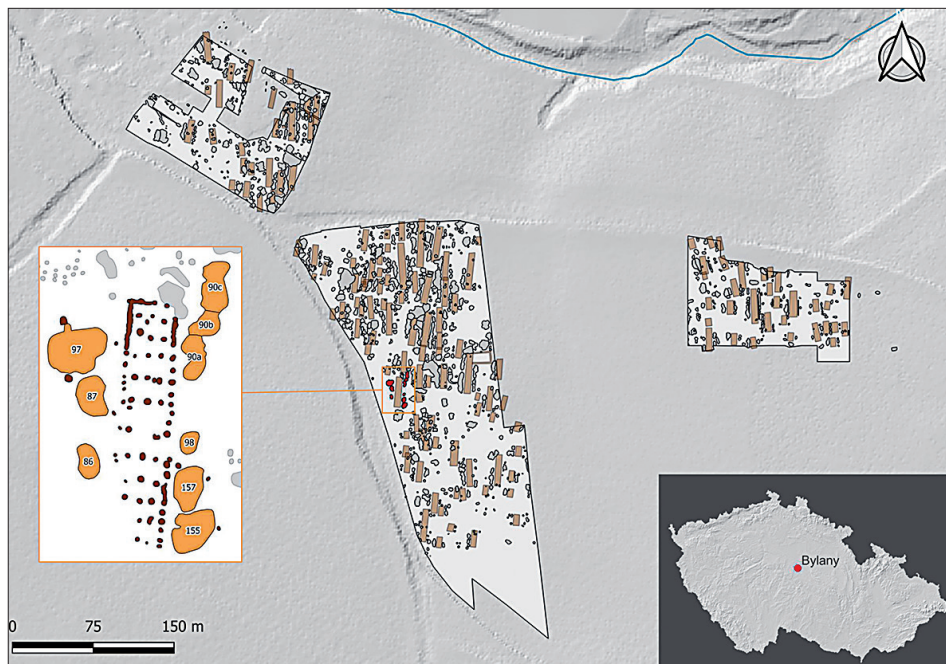


Fig. 1. Plan of the LBK settlement in Bylany near Kutná Hora with marked analysed sunken features (orange) around the house no. 88.

1986; Pavlů 2000; Květina – Pavlů 2007). The only feature that was not considered part of the house unit is the pit 155 because it contained pottery of a different style. However, it was included in the analysed assemblage because it lies 1 m east of the house wall and thus falls within the house unit in a strictly spatial sense. The analysed assemblage thus consists of six pits and one pit complex divided into three parts. During the excavation, the individual features were uncovered in mechanical layers, allowing the ceramic material from individual depths to be divided.

The selected house unit was considered suitable for the analysis of fragmentation and formative processes also for its large ceramic assemblage. It consists of 1255 ceramic specimens made up of 1694 ceramic fragments. The following characteristics were measured for each fragment: weight, size, wall thickness, degree of abrasion, and concavity. The weight of the fragments was measured in grams and the sherd wall thickness in millimetres. Size was estimated as the longest measurable dimension of the fragment in centimetres. Three groups were characterised as degrees of abrasion: A – heavily worn sherds, which generally do not have a preserved edges at the fracture points; B – moderately worn sherds, an intermediate stage in which the fracture edges are lightly worn; C – unworn sherds, which have a relatively sharp fracture edge. Fragment concavity was measured in millimetres and recorded only in cases when exceeded 5 mm. The observed metric and qualitative variables were subsequently linked with data previously recorded in the Bylany Database, such as linear decoration style, material, vessel shape and others (Květina – Pavlů 2007). The refitting of the specimen's fragments in space was also observed for the

Feature	Fragment density (frag/m <sup>2</sup> )	IF (mean)	SW index (mean)
86	14	2.56	5.68
87	30	2.58	5.14
97	14	2.56	6.13
98	10	2.55	5.61
155	34	3.13	6.78
157	17	3.64	6.78
90a	9	1.88	5.47
90b	110	2.98	6.16
90c	128	3.20	6.44

Tab. 1. Values of fragment density, fragmentation index (IF) and size/wall index (SW) in each sunken feature.

ceramic specimens. For technical reasons, this aspect was only observed within individual pits and not among them.

The criteria observed are not always clearly determinable, yet their monitoring is important for the study of formative processes. For example, the categories of abrasion are to some extent subjective and can be assessed differently by two people. To minimise this bias, all data were collected by one person. A second category that cannot be measured accurately is the wall thickness of ceramic sherds, since it can vary from section to section. In this case, the average wall thickness was always measured.

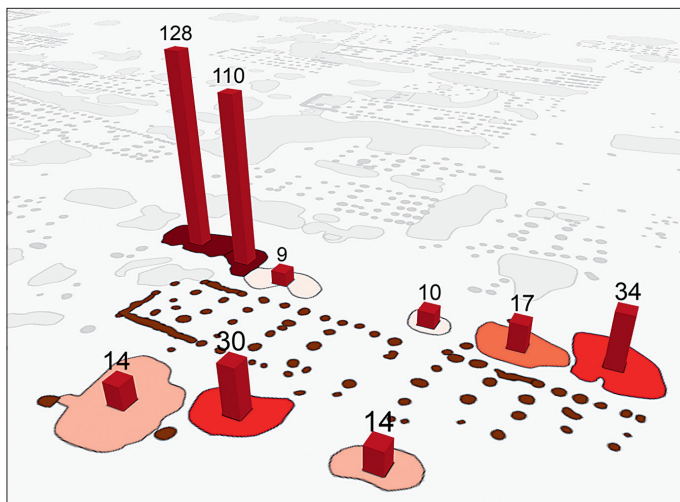
The obtained data were statistically evaluated using MS Excel, Jamovi, and SPSS software. The differences in variability were tested using analysis of variance (ANOVA). To describe the fragmentation of the particular assemblage, the already existing approaches, namely the SW and IF indexes, were used. The SW index (size/wall index) was introduced in 2005 and expresses the ratio of the maximum measurable length of a sherd to its thickness (*Květina 2005*). This estimates the proneness to fragmentation which is higher in case of thinner and larger sherds. In 2012, the IF (index of fragmentation) was introduced and, unlike the SW index, it is not based on fragment size but on fragment weight (*Kuna – Němcová 2012*, 185; *Kuna 2015*, 282). The main reason for employing this index was the fact that the SW index tends to be distorted in case of significantly thin- and thick-walled sherds. Both indexes were used for the analysis of the assemblage because each reflects a different aspect of the fragments (size/weight).

Another observed criterion was the densities of artifacts in the features. Densities were calculated for individual sunken features and their layers. For this purpose, their volume first had to be estimated. Thus, the ideal surfaces of the top and bottom of the mechanical layers were recreated from the ground plans and sections of the features. These areas, together with the height of the layers, were then used to calculate the volume of the truncated cones that approximates the original volume of a given context. Results of this volume modelling method was then compared with a 3D model created using Blender software. The deviation between the two methods was eventually found to be relatively low (values differed by about 2 %).

## Results

Analysis shows that the character of the fill of individual pits varies significantly. The density of the fragments and their fragmentation is a crucial indicator in this context. The frag-

Fig. 2. Differences in fragment densities. Displayed values are in fragments per cubic metre.



ment densities of the individual features vary in some cases by more than tenfold (Fig. 2). Level of fragmentation of the ceramic material shows less but still some diversity.

Individual features and also the parts of their fill both have a heterogeneous character. There are significant differences in density and fragmentation between the individual layers of the fill. The distribution of specimen's fragments also indicates the inhomogeneity of the fill (Fig. 3). In the case of some features (no. 87, 90b, 97, 157), these form separate group or groups that only slightly overlap with adjacent layers. The opposite case may indicate a mixed ceramic assemblage across the fill of the feature (no. 90c, 155). The analysed features did not show the same trend of increasing ceramic density towards the upper layers that has been observed at other sites (Květina 2005, 10). The density of ceramics in each layer varies from feature to feature.

The results also showed that the individual styles of linear decoration are found in different qualitative states in the studied features. In this respect, the values representing the fragmentation of ceramics expressed by the SW index and IF are particularly telling (Fig. 4).

The influence of formative processes on individual decorative styles was then demonstrated using the gradual filtration of ceramic fragments. In this process, the most fragmentary sherds from three pits that had a sufficiently high number of decorated specimens (the lower limit for analysis was 50 typical specimens) were successively removed from analysed assemblage in three stages. These stages were determined by the 20th, 40th and 60th percentiles of the SW index and also the IF of all fragments. After the third filtration step, only the set of ceramic specimens consisting of fragments with a low level of fragmentation remain, and, on the contrary, specimens whose fragments show metric traits typical of a long taphonomic path<sup>1</sup> are removed. During the gradual removal, one can also

<sup>1</sup> The *taphonomic path* (Vondrovský 2021, 67) means a series of changes an artefact has undergone before its final deposition. We can associate a zero taphonomic path with primary waste and on the contrary a long one with, for example, tertiary waste formed by erosion (Ernée 2008, 104–108; Řídký et al. 2014, 590–591; Vondrovský 2021, 160).

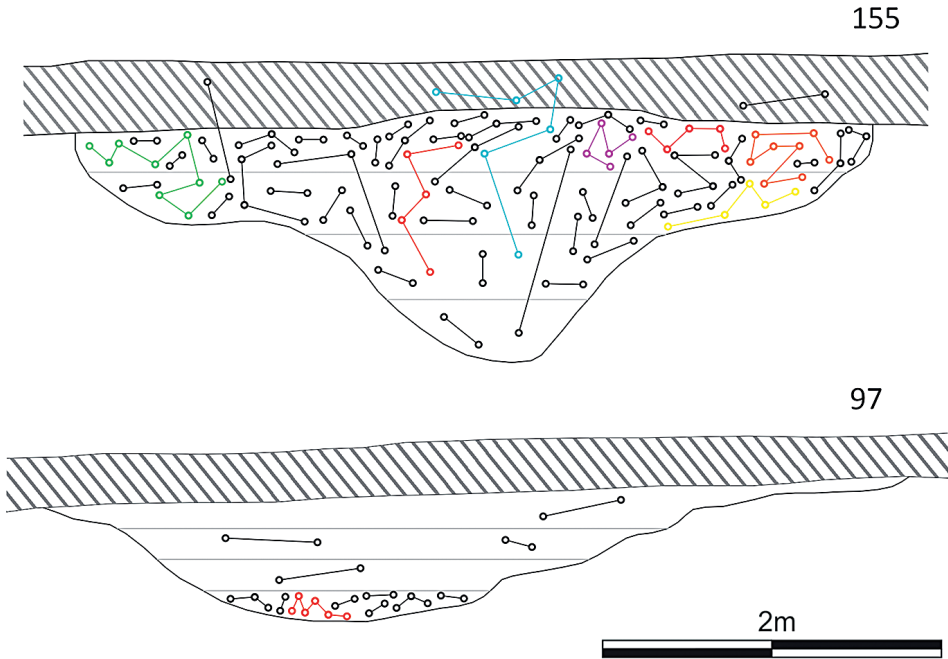


Fig. 3. Comparison of the refitting of vessel fragments across the mechanical layers of sunken features no. 155 and 97.

observe whether the individual decorative styles decline uniformly or whether their relative representation changes significantly.

The results of the gradual filtrations show that the proportion of decorative styles does not remain uniform (*Fig. 5*). On the contrary, for all features, there is a significant decline in the relative number of specimens decorated with simple engraved lines (denoted DELTA10, indicated by the red arrow in the graphs). The decline of the DELTA10 style was also reflected in a higher proportion of lines decorated with 'musical note' ornament (indicated by the green arrow in the graphs).

## Discussion

### Character of Neolithic feature fill

Analysis of the formative processes shows that the group of features under study, which were previously perceived as a homogeneous house unit, differ fundamentally in the structure of their infill. These were apparently formed by different mechanisms, with the participation of different assemblages of artefacts and in different time horizons.

The first aspect discussed is the category of waste that was getting into the infill of the features. Traditionally, the categories of primary and secondary waste have been used to characterise it (*Schiffer 1972*, 161). Primary waste means material deposited directly at the site of the activity where the waste was originated. Secondary waste, on the contrary,

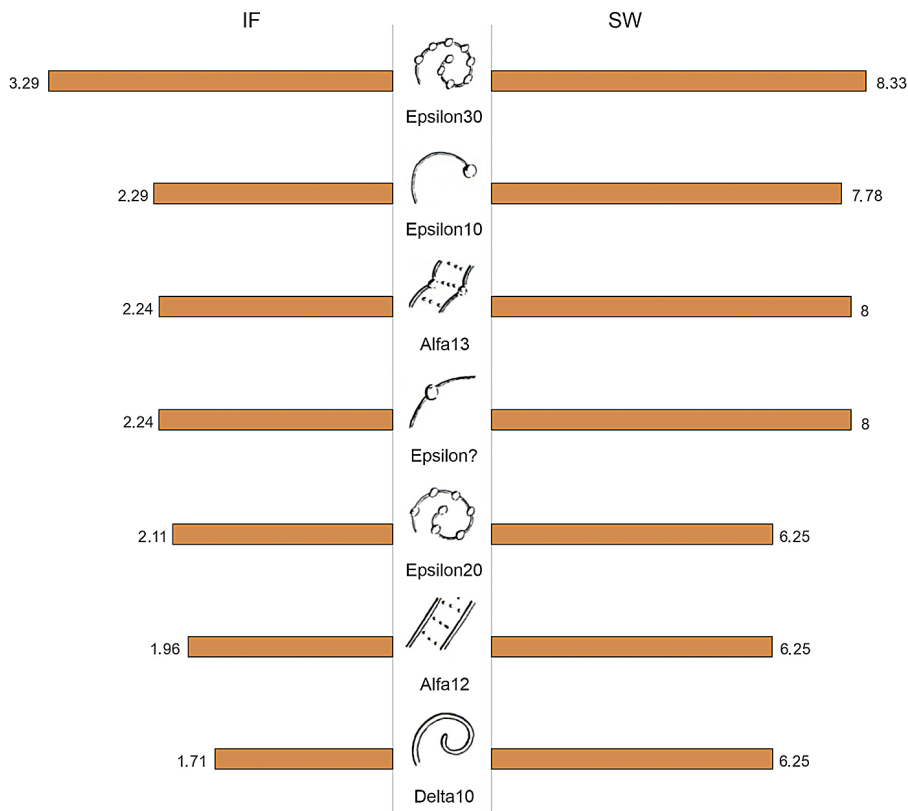


Fig. 4. Average fragmentation value (expressed by IF and SW indexes) of each linear decoration style from all analysed features.

means material that has been purposefully moved to a designated location – the refuse area. To explain more complex settlement situations, the category of tertiary waste was defined to characterise artefacts that reached their final deposition location from their original intentional placement along with the material/layer they were part of (*Neustupný 1996, 496; Kuna – Němcová 2012, 197; Kuna 2015, 281*). This could happen by natural processes, such as erosion, or by intentional redeposition of older waste deposits. It is in this category that most of the material analysed could be placed. The very low representation of specimens in particular leads to this interpretation. The vast majority of the specimens consist of one or two fragments (80 % of the specimens are represented by a single fragment) making up only a small part of the original vessel. Thus, these fragments must have gotten to the archaeological context (*sensu Schiffer 1972, 157*) from their original deposition site in a limited amount. Cases that could be interpreted as secondary waste were minimal in the contexts studied; examples include specimens from which a proportionally larger part made it into the archaeological context and are thus represented by more numerous and larger fragments. The disappearance of the unfound parts of the vessels from the settlement area can be explained by the destruction of not only the above-ground deposits but also of the cultural layer and the original upper part of the sunken features

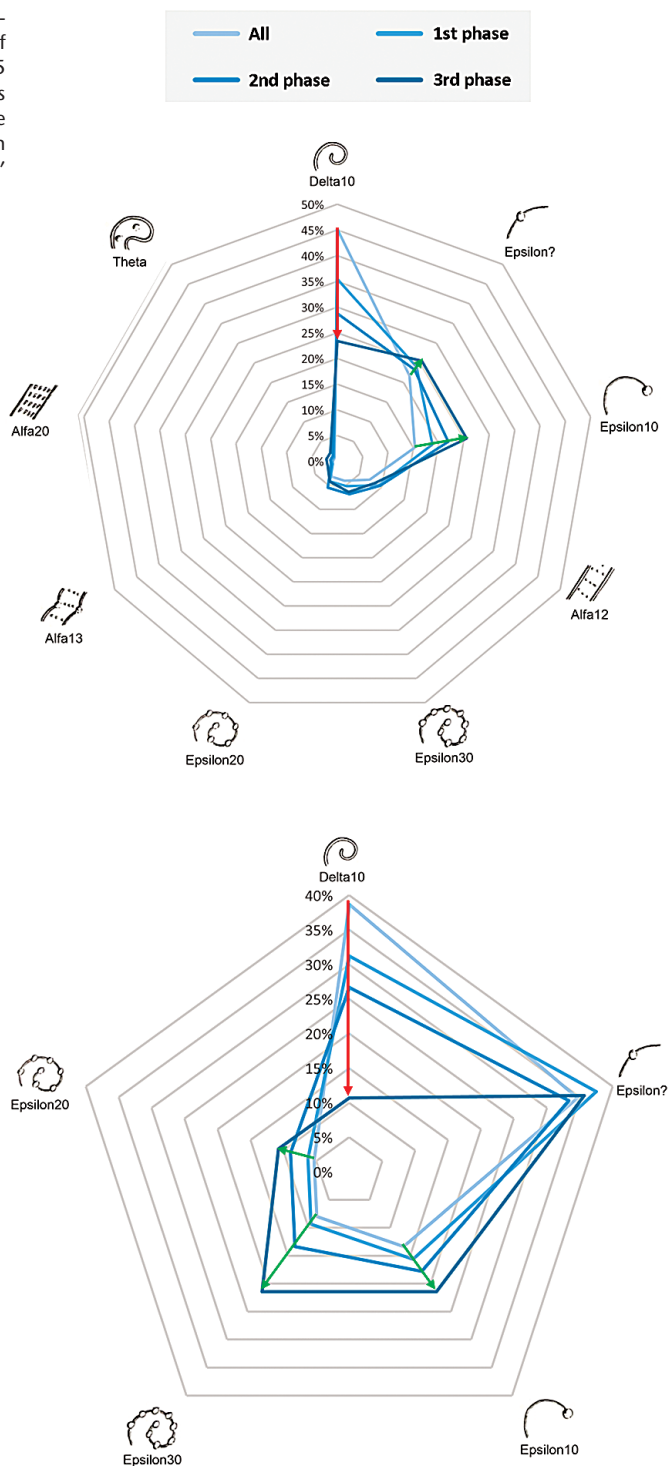
(Allard *et al.* 2013, 14; Květina – Hrnčíř 2013, 326). These may have been destroyed in the past or relatively recently by erosion, agricultural activity, or mechanical uncovering (Řídký *et al.* 2012, 632–633). It is likely that the largest amount of pottery (and of course other waste) was originally found in these unpreserved parts (Ernée 2008, 149; Vondrovský 2021, 208). However, we believe that the surviving objects are not just marginal bottoms of the original waste pits. Some of the features still reach considerable sizes and depths, and also no trend was found in the examined assemblage to show that the upper layers in particular contained directly deposited waste. The explanation for the depositional structure of the features must therefore be sought first and foremost in the waste management practices of the Neolithic communities.

Characterising the formation mechanism of individual fills is problematic because different processes can leave similar archaeological records. At the same time, we do not have robust comparative data to help us fully understand the possible mechanisms by which features are filled at prehistoric settlements. Our knowledge relies primarily on ethnography and experimental archaeology (Lüning 1981; Hayden – Cannon 1983; Deal 1985; Tichý 2001; 2015). However, these studies are never able to fully simulate the treatment of waste in prehistoric settlements. Experimental reconstructions can never authentically simulate the daily and long-term processes on a settlement, such as trampling, animal activity, or the disturbance caused by children's playing (Hayden – Cannon 1983, 131). Ethnoarchaeological studies, on the other hand, come from a different cultural and natural environment and a much younger period. Thus, we can only help ourselves with some ideal types of individual mechanisms and their reflection in the fill of features (Vondrovský 2021, 68).

Despite the problems mentioned above, the obtained data allow us to make some comments on the mechanism of the formation of fills. The refitting of fragments between mechanical layers shows that the fill of some features may have been formed in multiple stages and could have included multiple unmixed assemblages (Fig. 3). Otherwise, the filling of features in multiple phases by a single already-mixed assemblage is not ruled out. The variation in the density and fragmentation of pottery between the different layers indicates that the fill may not have formed uniformly. The mechanism of the formation of the fills cannot be determined unequivocally, but for the studied features/layers whose fills are composed of a low number of fragments with a high degree of fragmentation and abrasion, we can expect a significant influence, for example, by erosion processes. Conversely, for features/layers whose fills contain a larger number of ceramics and include fragments with low levels of fragmentation, abrasion, and concavity, we can expect intentional filling. Unfortunately, none of the mentioned aspects can answer the question of how long after their creation the features were filled.

In interpreting the primary function of pits at LBK settlements, most authors have considered the need for a source of soil as a building material for wattle and daub over daub walls (Soudský 1966, 33). In addition, there are possibilities that the pits were used for mixing and preparing daub, draining rainwater, and/or simply providing a suitable area for waste disposal (Allard *et al.* 2013, 12). Once this primary purpose was fulfilled, the features remained functionless within the settlement area (according to some views, they were used for deliberate waste disposal) until they were gradually filled in. In the case of some buildings, however, we find indications of other activities that took place directly within them – for example, kilns. These show that at least some of the pits were not quickly

Fig. 5. Results of gradual filtration of the decoration styles of feature 90c (above) and 155 (below). The red arrow shows a decline of DELTA10 (single engraved line), and the green one increase of 'musical note' decoration.



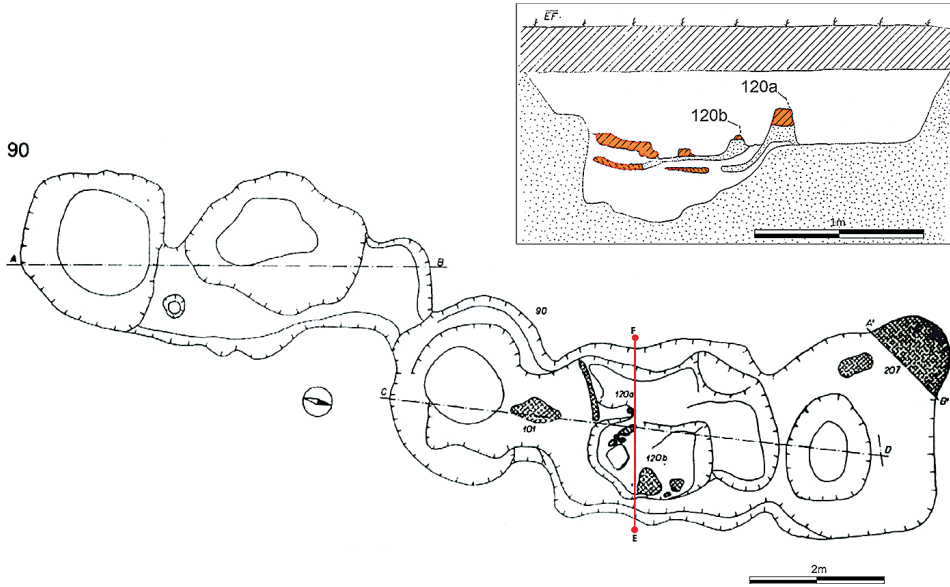


Fig. 6. Pit complex no. 90 with relics of two kilns (120a, 120b) used in an already partially filled pit. Remains of the bottoms and walls made of compact daub have been preserved from these kilns and are highlighted in orange (adapted after unpublished drawing from the Bylany archive).

filled in after their construction but were part of the daily/seasonal activities. In the case of investigated pit complex 90 from Bylany (Pavlů – Zápotocká 1983, 32; respectively parts 90b and 90c), there is even a known case where the kilns are not dug into the subsoil but lie in the middle of the pit fill. Thus, they must have been placed in an already partially filled pit (Fig. 6). This feature is a good illustration of the gradual filling of pits, which may have covered a longer time span overall. In the case of the investigated assemblage, a high concentration of pottery is typical for contexts with the presence of kilns. However, further analyses will be needed to draw broader conclusions regarding this phenomenon.

The aforementioned waste characteristics refer to much more complex treatment of settlement waste than previously assumed (Soudský 1962; Pavlů et al. 1986). The waste from individual houses apparently did not, for the most part, find its place directly in the adjacent pits, but was deposited elsewhere in the first phase. This could be in the area of the settlement and partly also inside the houses including abandoned ones. This conclusion is indicated by the minimal number of specimens that travelled a short taphonomic path to the place of their deposition. Such finds would evince reconstructable larger parts of the vessels, low abrasion, and fragmentation rates. At the same time, the occasional presence of larger and concave fragments suggests that this was not a transfer of material from a cultural layer where the ceramic material would have been largely deformed by trampling or other daily activities (although the presence of larger fragments is not excluded there either – Vondrovský 2021, 210). Thus, ceramic waste could have been deposited in a variety of above-ground deposits, such as heaps (Fig. 7). From this location, the waste could have been transported by various mechanisms and at various times into sunken features.

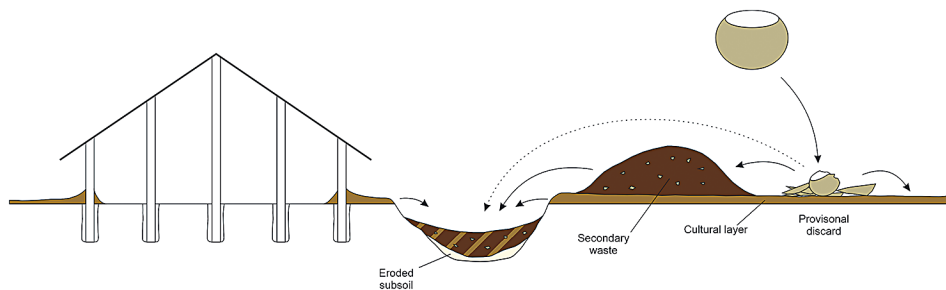


Fig. 7. Diagram of hypothetical ceramic waste management on LBK settlement. We assume that the ceramic material was mostly coming into the infill of the features from other places of secondary deposition (heaps, etc.) and cultural layer. This mechanism would explain the majority of fragmentary, abraded vessels represented by only one or two sherds.

Therefore, it is not possible to determine whether the waste in the selected pits actually reflects life in the adjacent house.

### Linear decoration style and its perception

Ceramic fragments with specific decorative styles were found in different qualitative states in the sunken features. In other words, some styles are more fragmentary than others in the studied assemblage (Fig. 4). This phenomenon could have several causes:

The first aspect could be *different levels of recognisability* – i.e. different decorative styles may be identified by an analyst only from a certain size of the ceramic fragment. For example, the decoration with a simple engraved line (DELTA10) can be determined even on the smallest sherds and, on the contrary, the decoration with a specific ‘musical note’ decoration can be traced only on noticeably larger sherds. Apparently, small fragments of vessels of various decoration styles may appear as simple lines and thus artificially increase their representation in analysed assemblages.

The second aspect could be the *merging of several chronologically or taphonomically distinct assemblages into one*. If older residual material (intrusion) from a cultural layer, for example, entered the fill of a feature, its character could be more fragmentary.

The third aspect is the *behavioural dimension of waste management*. It is possible that the longevity of some styles was different from the average. This would mean that vessels decorated with these styles either went to waste more frequently or, more likely, less frequently due to discard resilience (e.g. they were not mundane vessels). Pottery vessels with different decoration may not only have constituted a chronological variable but their diverse significance in a systemic context may also have been reflected in the manner of their deposition. This aspect could subsequently be reflected both in the composition of the styles found and in the level of their fragmentation.

For a critical evaluation of the decorative styles in individual sunken features, the results of gradual filtering are a good indicator (Fig. 5; see Material and methods). They show decline of simple engraved lines in the analysed assemblages and, on the contrary, a more frequent occurrence of ‘musical note’ decoration. To some extent, this may be due to the higher level of recognisability of the simple engraved line, but it may also reflect, for example, the presence of an older more fragmentary assemblage that may have entered the

feature by other mechanism. After this older fragmentary assemblage is removed, the feature would be re-dated to a later horizon according to the current chronology. The use of gradual filtration would thus indicate the presence of older residual material with a longer taphonomic pathway than the younger one.

The above-mentioned phenomena significantly undermine the foundations of the current chronology of the LBK in Bohemia, which was based on the differences in the proportion of decorative styles. We argue that the different portions may not have been the result of different ceramic production in the two time periods, but simply the result of different taphonomic processes of the individual feature. It is thus clear that it is no longer possible to examine only the relative representation of decorative styles, but fragmentation must be taken into account as well.

### **House unit – a functional model or an outdated one?**

The sunken features within the defined radius around the houses clearly did not have to be created and abandoned at the same time and did not have to involve material from the adjacent house. The features vary in purpose, shape, and size, and it is also evident from the given examples that their fills may have been created by different processes, with different dynamics, and may have contained different compositions of artefacts. The features around the houses are thus a collection of singularities that must be approached individually (*Vondrovský 2021*). This conclusion, however, does not mean that there is no relationship between houses and surrounding features. Some of the features clearly respect the ground plans of the houses (or their relics). At the same time, we can assume that some of them were built and used together with the adjacent house (*Gomart et al. 2015*). A fundamental problem is the normative grouping of features related to the house and the unsubstantiated association of their fill with activities in the house, especially in the case of densely built-up settlements. In fact, the waste management of individual houses might not respect the spatial distribution of the houses and instead might work on a settlement-wide level (*Stäuble 1997*).

Analysis of artifacts offers only limited clues on the issue of reconstruction of feature fill. Yet, the refitting of fragments of original ceramic specimens can at least indicate the mechanism and phases of the filling process. At the same time, values such as fragment density, fragmentation, abrasion, and sherd concavity may bear testimony to the mechanism of layer formation, but we can only associate them with the assumed ideal types of these processes. Comparative empirical examples of the influence of similar filling mechanisms on ceramic material are unfortunately not available (*Tichý 2001*). To better understand these processes and their chronology, it will be necessary to incorporate, for example, micro-morphological analyses and exact radiocarbon and/or luminescence dating into future feature-filling studies (*Van Mourik et al. 2011; Janovský et al. 2020; Lisá – Trampota 2020*).

The results of the analyses also question the very foundations of the existing chronology of the LBK in Bohemia. It uses the house unit as the basic chronological entity, works with values of proportion of decorative styles and does not address the issue of possible intrusions within the studied pits, although Bylany is a multi-phase, densely built-up settlement where their presence must be considered. The basic chronological divisions seem robust, but a detailed relative chronology requires revision that will rely on analyses of rather smaller settlements and absolute chronological data (*Květina – Končelová 2013*).

## Conclusion

In our analysis, the emphasis was placed on the characterisation of the fill of the excavated features in terms of ceramic material. Furthermore, attention was paid to the influence of formative processes on the decorative style of pottery with an overlap with the existing concept of the LBK chronology in Bohemia.

The individual features turned out to be incomparable to each other. Their fills are of a different character and were obviously created by different processes. At the same time, we are not yet able to identify the time horizon in which the fills were created or whether they are truly related to the adjacent house. For this reason, it is not possible to use house unit as an implicit assumption by which these features are transferred to the same level and are connected to the house and its inhabitants. Of course, this cannot rule out the possibility that in some cases features around the house may have functioned in the same period and to some extent represent the household, but such a conclusion needs to be supported by valid data (*e.g. Gomart et al. 2015*).

When investigating the influence of formative processes on decorated vessels, different levels of recognition of individual styles were demonstrated. At the same time, using gradual filtering, the uneven representation of individual decorative styles in terms of fragmentation was found. We believe that this method could contribute with the indication of intrusions within contexts during future research of LBK settlement sites.

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