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LITHIC TECHNOLOGY AND SPATIAL STRUCTURES OF THE CAMP AS SEEN IN LITHIC REFITTINGS FROM HAMBURGIAN SITE AT MIRKOWICE

ABSTRACT

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Article present results of analysis of lithics from Late Palaeolithic Hamburgian site Mirkowice 33 located in the eastern part of Greater Poland. Analysis was conduct with the use of refitting method. Results show technological differences in lithic production and spatial structuring of the camp. It also presents the relations between particular zones of the camp and groups of products manufactured by the knappers with different lithic processing skills. Integrated technological and spatial aspects allow to study the social dimension of flint knapping at the site.

Key words: lithic technology, Late Palaeolithic, refitting analysis, spatial organization, social structure
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In recent years refitting has become a more and more common method of lithic analysis. The vast analytical possibilities and cognitive values of this method have been presented very often, also in Polish literature (Tomaszewski 1986, Fiedorczuk 2001, Wąs 2005). This article presents the results of lithic analysis from the Hamburgian site Mirkowice 33. The analysis had been done with the use of the refitting method. The results will

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be presented in two aspects which are the main analytical fields of the refitting method: technological and spatial. In the technological aspect, the focus will be on showing the technological differences between refittings which will allow a differentiation to be made between two categories of flint working skills. Both aspects of the analysis, technological and spatial, will be integrated to study the social dimension of flint knapping at the site.

1. MIRKOWICE 33 SITE

The site is located in the eastern part of Greater Poland, in the area of Żnin Plain, surrounded by the Mogilno and Chodzież Hillocks. From the north it is limited by the Noteć glacial valley and from the south by the Janowiec Hillocks (Fig. 1). The landscape is very pleated, crossed by glacial troughs formed during the last glaciation. On the edge of one of these troughs, nowadays filled with peat sediments, there is a sand dune, a few hundred meters in length, created during the Skoki-Janowiec oscillation (Kabaciński *et al.* 1999, 216). A Late Palaeolithic camp of the Hamburgian culture was recorded on that dune. Excavations covered two main areas of the site: the north part of the dune where concentrations of lithic materials were located and the area of a peat bog at the feet of the dune.

During the 1992–2003, 2005, and 2010 seasons an area *ca* 1000 m² was excavated. Excavations uncovered 5379 flints in total, of which 4266 were related to the Late Palaeolithic settlement phase. All materials were located in the sandy part of the site, grouped into two bigger and four smaller concentrations. The site belongs to the classic Hamburgian cultural horizon — one date directly connected with the settlement is known, obtained from the burned bones found in hearths (14 430 calBP — Kabaciński and Schild 2005). In addition, a number of dates for the stratigraphic sequence of the peat parts (completed in 2010–2011 by the research of Tephra sediments — Housley *et al.* 2014) were obtained. Unambiguous correlation between the biogenic layers and the Palaeolithic settlement on the dune still poses many difficulties. The lithics do not differ from classic Hamburgian inventories; within the tools group perforators (especially the Zinken type), endscrapers on blades and different types of burins are predominant. Although there are classic shoulder points, no Havelte points characteristic of the younger phase of Hamburgian Technocomplex were found. Technology was based on the opposite platform core from which blades were produced. The preparation of the core consisted mainly of a flaked surface; there are very few examples of regular platform preparation in the lithic inventory. In order to strike blades from the core, the soft hammer direct percussion technique was used (Chłodnicki and Kabaciński 1997, 20).

As a result of analysis obtained 59 refittings including 266 artifacts (6% of the assemblage) of which only 9 refittings contain more than few artifacts, longer sequences of several processing steps.

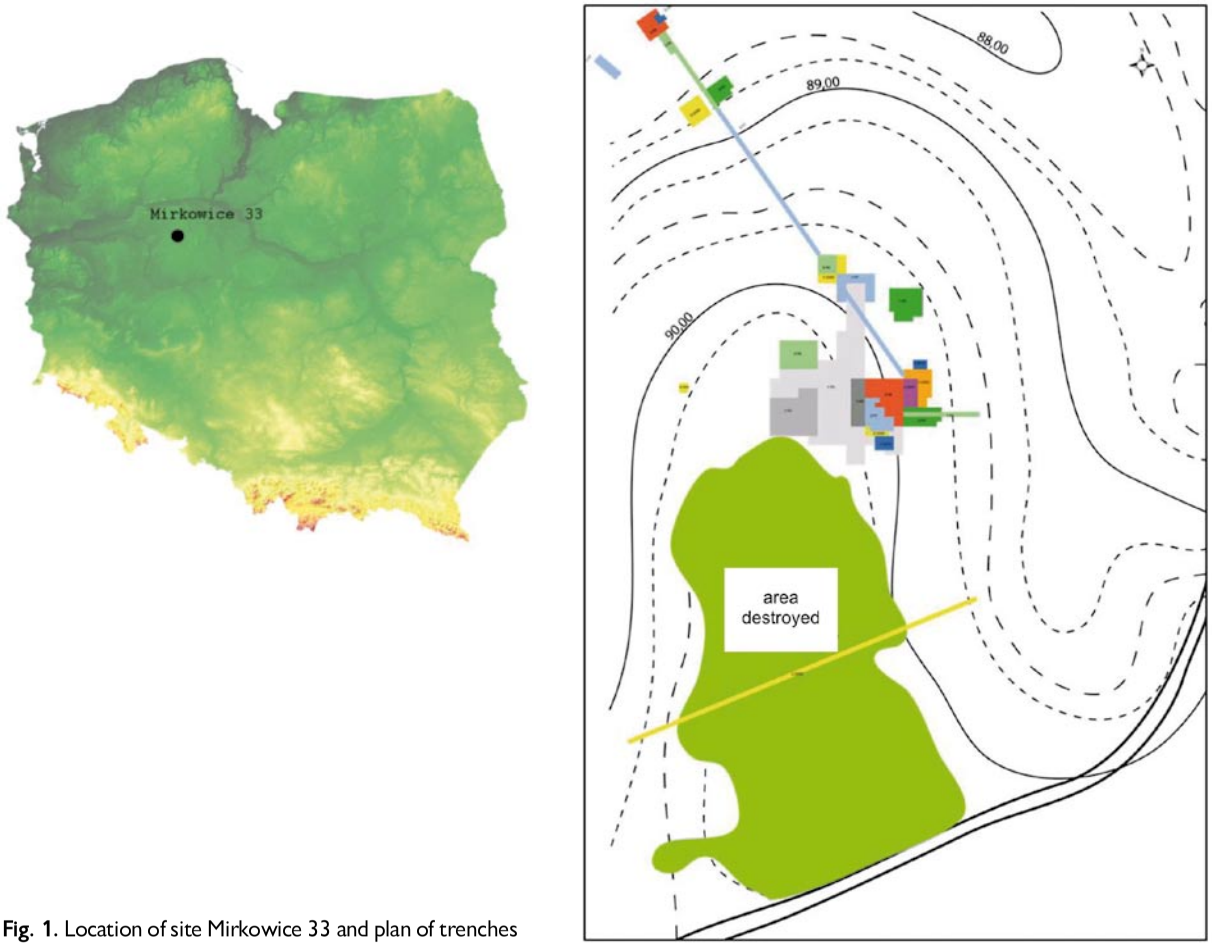

Fig. 1. Location of site Mirkowice 33 and plan of trenches

Fig. 2. Refitting M33-8

Fig. 3. Refitting M33-4

Fig. 4. Refitting M33-6

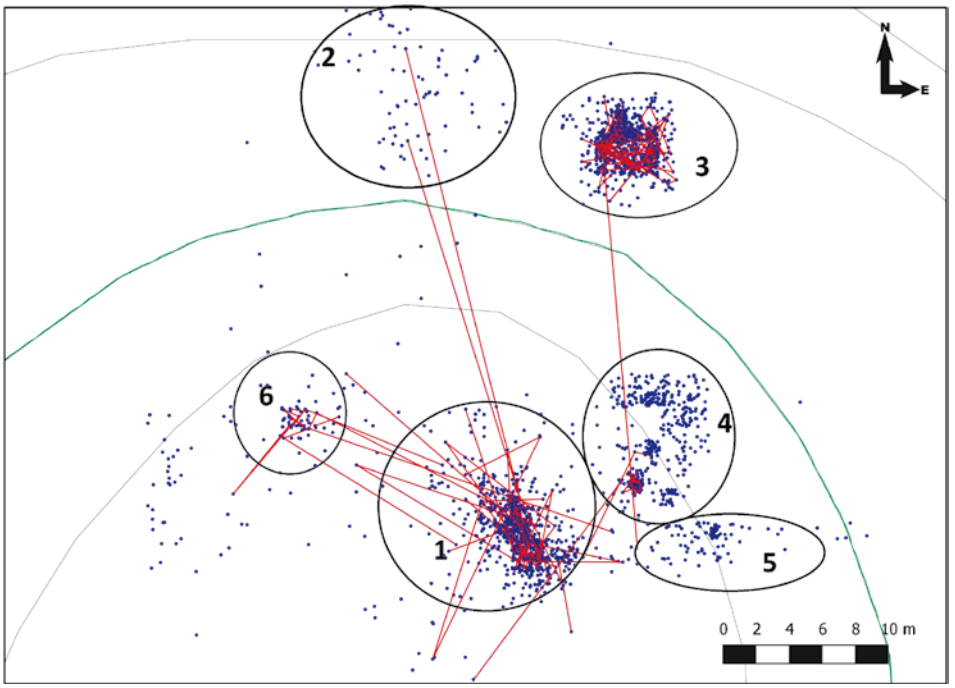

Fig. 5. Spatial distribution of palaeolithic materials with marked lithic concentrations and refitting connection lines

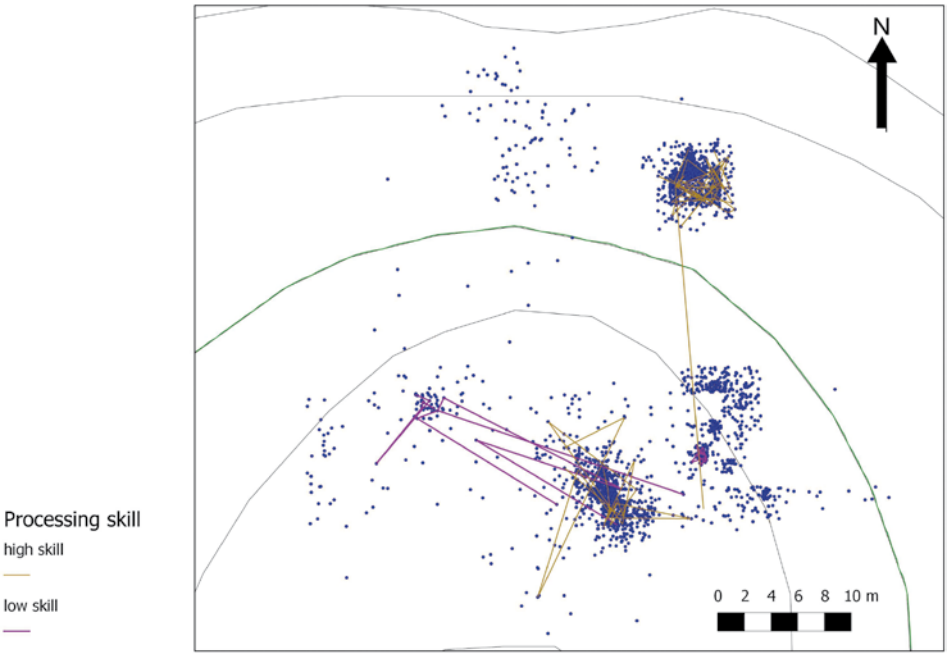

Fig. 6. Spatial distribution of refittings with different skill level of lithic processing

2. TECHNOLOGICAL ANALYSIS

Technological analysis of the flint inventories allows features essential for the identification of knappers with different technological skills to be determined (Bamforth, Finlay 2008). The largest group of features relates to the morphology of the products. High skills can be visible in: regularity of the form, unusually large size, complex form, extreme thinness in relation to the width, extreme length in relation to the width, and a symmetrical form (Bamforth and Finlay 2008, 5). The group of technological features indicating high skills include: a multistage reduction mode, regular retouching, intentional overshot flaking and regular platform preparation. Products of the less skilled manufacturer would not have these features, instead there would be numerous errors such as hinges and step termination, traces after missed hits and deviation from a standard operation chain. Another important distinguishing feature may be the degree of the utilization of the raw material and the 'coefficient of variation' measuring the standardization of the products (Bamforth and Finlay 2008, 5).

It is worth noting that individual characteristics may have different cognitive value for different types of technology. Morphological characteristics are more important indicators

Table 1. Technological structure and features of analyzed refittings

		technological structure							termination						coefficient of variation (lenght/width)	
		cores, cores fragments	early stage of preparation	rejuvanation	blade exploitation	flake exploitation	chips and chunks	tools and waste from tools production	step	hinge	plunging	platform edge preparation	impact point isolation	traces after shot	blade	flake
refitting number	1	3	2	–	–	–	8	–	–	–	–	–	–	–	–	–
	2	1	1	–	11	1	–	–	2	5	–	✓	✓	–	7,7/4	–
	3	1	5	1	7	1	–	1	–	–	1	✓	✓	–	–	–
	4	1	2	3	1	1	–	1	1	–	–	✓	–	–	–	–
	5	–	5	–	11	–	–	–	–	–	–	✓	–	–	16,1/8	–
	6	1	7	–	6	–	–	2	–	2	–	✓	–	–	6,1/9,3	6,9/7,8
	7	–	–	–	15	4	–	5	3	2	1	✓	✓	–	6,1/5,8	10/8,2
	8	2	1	–	7	9	2	–	–	–	–	–	✓	✓	–	5,2/3
	10	2	–	–	2	–	3	–	–	–	–	–	–	–	–	–

Table 2. Results of technological analysis. Set of refittings features defining skill level

		features				skill level
		compatibility with standard chain operation	debitage standardization	repearing treatments	processing efficiency	
refitting number	1	yes	–	no	low	low
	2	yes	medium	no	high	high
	3	yes	–	yes	high	high
	4	yes	–	yes	high	high
	5	yes	high	no	–	high
	6	yes	medium	no	high	high
	7	–	medium/high	yes	high	high
	8	yes	low	no	low	low
	10	yes	–	no	low	low

of differentiation in case of core technologies and bifacial forms, while blade/flake technologies use mainly technological indicators or degree of raw material utilization and the 'coefficient of variation'.

Despite successful attempts to apply these methods to determine the level of skills, we should be aware of the arbitrariness of the criteria we have used for measuring a knapper's proficiency. Each of these features is more or less burdened by actualism.

In the analysis presented in this paper, the following set of features were selected, the nature of the technology and the size of the refittings: compatibility with the standard chain operation efficiency of the knapping, debitage standardization (calculated using the 'coefficient of variation'), and occurrence of errors and corrections in response to the unforeseen events during knapping. The characteristics described above are both quantitative and qualitative, since some of the features cannot be measured numerically. As mentioned in the introduction, only two categories of skill level were defined. Such division is dictated by the assumption about the limited possibilities of the interpretation of this study, which does not permit more precise categorization. The refittings used in this analysis included nine examples which presented a complete treatment process or contain a large production sequence (Table 1). Only these refittings allowed a determination of skill category. Three of them were classified into a group representing lower technological skills (M33-1, M33-8 (Fig. 2), M33-10), and six refittings (M33-2, M33-3, M33-4 (Fig. 3), M33-5, M33-6 (Fig. 4), M33-7) were included in the latter category, characterized by higher skills. Assemblages placed in the first group were characterized by a low level of debitage standardization, no additional correction knapping and an overall low processing efficiency. High quality refittings were characterized mainly by the ability to correct errors, the productivity of the knapping and the high regularity of the products (Table 2).

3. SPATIAL ANALYSIS

Analysis of the refitting connection lines was preceded by the overall analysis of the distribution of the lithic materials. On the basis of this analysis six concentrations of flint material were distinguished (Fig. 5). Dispersion of the finds indicates the presence of two deposition zones: northern (concentrations 2 and 3) and southern (concentrations 1, 4–6), separated by a 15 m wide empty zone. In the southern zone, concentration 1 constitutes of a central area within which was found the highest density of the refitting connections. However, concentration 1 is not isolated. Multiple connections go beyond the concentration and connect with some of the subconcentrations on the western and eastern site, as well as loose and scattered material. From the southern zone, we can eliminate concentration 5, which was probably created as a result of the redeposition of the material during the formation of a Neolithic feature, and the northern and eastern part of concentration 4. It should be noted that this area, apart from the lack of connection lines, is also different in terms of its structure. Not only are there no tools, the main categories of which this structure is built are flakes, chips, some blades and a few repair forms located in the northern part of concentration 4.

The northern zone consists of two clusters of very different character. Concentration 2 is scarce and highly dispersed, with a strong predominance of the tools in its inventory. Therefore, the lack of more refitting sequences is not surprising. However, a single refitting of a modification and a fracture was enough to connect concentration 2 with concentration 1. Concentration 3 is the most problematic in the context of its relationships with other clusters. It contains a lot of multi-component refittings, which cover a dense network of refitting lines. Nearly all refittings occur within a concentration. Only a single fracture refitting connects it with the southern zone — not with the main concentration, however, but only with the area outside it. In case of the high-density character of concentration 3, this single connection is not sufficient to consider it as belonging to one spatial network with the southern zone. However, concentration 3, although having the same amount of material and its density as concentration 1, differs both in terms of its greater compactness and its isolation. It is therefore difficult to treat it as an analogous activity center within the camp which dates to another episode of the settlement. Concentration 3 does not have its own spatial system with "satellite" smaller concentrations. It seems reasonable to conclude that concentration 3 is a special area of the camp that formed a part of a complicated system of spatial camp organization.

4. SOCIAL DIMENSION OF LITHIC TECHNOLOGY

As mentioned in the introduction, the proposed analytical procedure involves a combination of technological and spatial analysis. In the comparison between the image of the spatial distribution of flint artifacts in the form of a network of refitting lines and the results of technological analysis, the relationship between groups of different technological

skills and spatial structures can be seen. On the basis of technological analysis, three refittings produced by knappers, whose skill level was defined as less than the others, were separated from the other refittings. Refitting M33-8 is located entirely within the southern subconcentration of concentration 4; refitting M33-10 occurs in the area of concentration 6 and partly out of this concentration, towards the west; M33-1 combines concentration 4 with concentration 1, its elements being located in a scattered manner in the peripheral parts of concentration 1 and beyond (Fig. 6). Therefore, a spatial isolation of the refittings assigned to a group characterized by lower technological skill can be observed. None of them is closely related with main area of the camp. All are located within the southern zone, in separate concentrations on the western and eastern sides of the central region. The southern area was the dominant activity center in the camp. All processing activities are focused within or nearby concentration 1. The location of the hearth in the central part of concentration 1 seems to prove its significance. All refittings located within concentration 1 show the characteristics of high-quality processing. They are located mostly in the southern part of the concentration. In the peripheral areas — around concentration 1 and within smaller subconcentrations, refittings with the characteristics of low-skilled processing are located. Two separate areas in the southern part of the camp create a main region of regular flint high-skill processing, with its peripheral regions characterized by low-skill processing. Concentration 2 seems to be a separate region that is significantly distinct from the others, taking into account a completely different type of practices which are unrelated to intensive treatment of the flint. Evidence of this is seen in its inventory structure — an almost exclusive presence of tools, without any debitage and a lack of connections lines, with only a single occurrence of the refitting of modification and thermal fracture. Concentration 3, at the present stage of the study, can be treated in two ways: as another spatially isolated area of the camp which saw high-quality processing of flint, or as an autonomous region, a trace of a short-term stay, associated with a different period of the settlement.

CONCLUSIONS

As a result of a combined technological and spatial analysis, the relationships between particular zones of the camp and groups of products manufactured by the knappers with different lithic processing skills were shown. These relationships correspond with the spatial dimension of the camp — refittings belonging to different categories of the skill level were located in the separate parts of the camp. This means that the space was structured not only functionally — due to the type of the operation performed, but also socially — due to the actions taken by the knappers of various technological competencies. An analogous situation, the occurrence of the social division of space, was recognized at the Magdalenian site at Etiolles (Pigeot 1990, 132). A similar space structuring has also been spotted at the Pincevent site (Bentsen 2010, 49–50). Refitting analysis, as presented in this paper, can therefore reinforce the thesis of the social structuring of the camp space in the Late Palaeolithic.

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