Analecta Praehistorica Leidensia 35/36 / Beyond the Site : the Saalian archaeological record at Maastricht-Belvédère (the Netherlands)

De Loecker, Dimitri; De Loecker, Dimitri; Fennema, Kelly; Oberendorff, Medy

ANALECTA PRAEHISTORICA LEIDENSIA 35/36

ANALECTA
PRAEHISTORICA
LEIDENSIA 35/36

PUBLICATION OF THE FACULTY OF ARCHAEOLOGY
UNIVERSITY OF LEIDEN

DIMITRI DE LOECKER

BEYOND THE SITE

THE SAALIAN ARCHAEOLOGICAL RECORD AT MAASTRICHT-BELVÉDÈRE (THE NETHERLANDS)

UNIVERSITY OF LEIDEN 2004

Editor: Harry Fokkens / Corrie Bakels

Copy editors of this volume: Dimitri De Loecker / Kelly Fennema / Medy Oberendorff

ISSN 0169-7447

ISBN 90-76368-12-0

Subscriptions to the series *Analecta Praehistorica Leidensia*
and single volumes can be ordered exclusively at:

Faculty of Archaeology
P.O. Box 9515
NL-2300 RA Leiden
the Netherlands

“De wetenschap is geen perfect instrument, maar het is wel het best mogelijke instrument. Net zoals de democratie niet het perfecte, maar wel het best denkbare systeem is.”
(van Springel 1999:4).

Contents

5 Patterns of behaviour: spatial aspects of technology at Maastricht-Belvédère, Unit IV

5.1 Introduction

The well-excavated findspots at Maastricht-Belvédère (Roebroeks 1988; Vandenberghe *et al*. 1993; Chapters 3 and 4) documented a number of well-preserved 'on-site' activities. Generally, the main archaeological level (Unit IV) seems to indicate that at least a small segment of the intra-Saalian Meuse valley bottom was frequently visited by Middle Pleistocene early humans. These early humans possibly left a continuous artefact distribution behind on the palaeo-surface of the riverside landscape. In this technological landscape, referred to as a 'veil of stones' by Roebroeks *et al*. (1992), different kinds of artefact distributions have been discarded during 'limited' periods of time. The excavated areas show internal variations in artefact density and composition, *i.e*. the 'high' and 'low' density distributions. Both provide different but complementary information for a better understanding of early human behaviour.

In this chapter a presentation of the variations in the local Saalian record is given, focusing mainly on Sites C, G, F, H, K and N. The comparison is followed by a discussion of the implications this 'off-site' research may have for our understanding of the Middle Palaeolithic record. This chapter is based on the 'veil of stones' model, published by Roebroeks *et al*. (1992; see also De Loecker and Roebroeks 1998), and supplied with additional data obtained in more recent analyses. A detailed review of the used site data is given in Appendices 2 to 11. Moreover the numbers, percentages and ratios used here differ slightly from the figures given in previous Belvédère publications (amongst others Roebroeks 1988; Roebroeks *et al*. 1992, 1993). This is mainly the result of the re-examination of the flint artefacts in the context of this PhD dissertation.

5.2 Isaac's hierarchical model for structuring spatial artefact distributions

Most excavated Palaeolithic sites are "… concentrated, localised accumulations of refuse which represent acts of discard repeated by numbers of individuals over a span of time." (Isaac 1981:133-34). These concentrated patches of artefacts and bones, with a high archaeological visibility, are still the main focus of Palaeolithic fieldwork. However, mainly because of Isaac's (1981) work at Koobi Fora (Kenya) archaeologists came to realize that these 'classic' sites are mostly present against a background of 'low density' scatters, covering isolated or small sets of artefacts. It is clear that if one wants to study past behaviour, all available archaeological data should be used for interpretation. Therefore the scatters with their low visibility and the 'high density' patches should be treated equally in the study of Palaeolithic artefact patterns.

In his 'Stone Age Visiting Cards' article, Isaac (1981) proposed a hierarchy of levels for structuring spatial distribution of Early Stone Age relics (see Isaac 1981:138, Figure 5.4). The previously mentioned isolated artefacts, the kind of items one occasionally encounters when surveying sections (*i.e*. cross-sections through former land surfaces), represent the first level of his model. A next level is formed by single action clusters, for instance a set of conjoinable flakes from one knapping episode. The third level can be of variable scale, but it is always a complex cluster of first and second level occurrences, representing a number of episodes or a number of different actions. Most archaeological sites are composed of materials at this third level, *i.e*. clusters of clusters. Isaac sees sites, or *locales* (Gamble 1995) consisting of scatters and patches, as forming a patterned set across the face of a region (palaeo-landscape) with locations determined by such factors as distribution of resources, networks of communication and population density (*cf*. Gamble 1986; Roebroeks and Tuffreau 1999). This fourth level is commonly referred to as a 'settlement pattern' or 'regional system'.

The model stresses the importance of treating the distribution of patches and of isolated artefacts as parts of one single system (see also Foley 1981*a* and *b*) in our search for movements of Palaeolithic foragers through former landscapes. Although the 'scatters and patches' approach received little attention in the 1980s, in the last decade it gained some interest through the work of amongst others Stern (1991, 1993) Roebroeks *et al*. (1992) and Conard and Adler (1997).

This chapter takes up some elements of Isaac's approach by presenting (see Chapters 3 and 4) and discussing the results of the different Saalian Maastricht-Belvédère studies. In general two main questions will be tackled:

1. How informative are the recovered assemblages for reconstructing Middle Pleistocene early human behaviour in terms of the functional character of these sites.
2. And what do these findspots indicate about the subsistence settlement system in which they were formed.

To obtain answers to these questions, the Unit IV lithic distributions of the Belvédère sequence will be compared with one another initially. Subsequently, the inter-site variations will be interpreted in terms of past behaviour. Here, topics like transport of lithic material and/or expedient use of technology will be dealt with. A short note on the 'contemporaneity' of the different assemblages is given before the comparison.

5.3 Contemporaneity of the Unit IV artefact distributions

As discussed in previous chapters, the Saalian lithic artefacts at Belvédère were recovered from two distinct major find levels: *i.e.* the lower Subunit IV-B (Sites B, C and G) and the upper Subunit IV-C-ß (Sites A, D, F, H, K and N). If we want to evaluate the (inter-)site data of these levels, and make meaningful inferences on past behaviour, we will have to justify that the excavated material belongs to one and the same 'cultural system'. This subject of research is already discussed in detail by Roebroeks (1988) and he gives the following conclusion:

> "…, in all probability, they [the Unit IV findspots, DDL] can be interpreted as the remains of one and the same cultural system, which were created under more or less the same environmental conditions, over a relatively short period of time. The sites are contemporaneous in Pleistocene terms, having been formed in the same warm-temperate period. The Unit IV-C-I sites [this is Subunit IV-B (Vandenberghe *et al.* 1993), DDL] are very probably contemporaneous in terms of age differences of several hundreds of years. The age difference between the lower- (IV-C-I) and upper-level (IV-C-III) [this is Subunit IV-C-ß (Vandenberghe *et al.* 1993), DDL] sites is more difficult to estimate, … There are, however, no geological arguments for assuming large time differences, i.e. thousands of years." (Roebroeks 1988:133).

More importantly, Roebroeks emphasizes that there are no reasons to assume that significant changes in raw material availability (amongst others distance to the flint and food sources, flint quality, etc.) had taken place during the relatively short period of assemblage formation. In fact the artefact occurrences have been documented within an area of about 6 hectares, indicating that the assemblages were formed in comparable local environments (Roebroeks 1988; Vandenberghe *et al.* 1993). All these arguments, suggesting a 'contemporaneity' of the Saalian findspots, indicate that the variations in assemblage characteristics might be due to other factors than time differences. Mainly early human behaviour and minor natural site formation processes can be mentioned. Precisely these research conditions were the inspiration for the long-lasting field efforts, which resulted in the several excavated areas, test trenches and section observations.

5.4 Comparing the Unit IV Saalian assemblages

5.4.1 Introduction

The sample of individual assemblages excavated at Maastricht-Belvédère provides a good overview of the technological landscape discarded as a result of early human behaviour. Moreover the archaeological material recovered from the excavated surfaces provides a precious set of behavioural data which can be placed in a distinct intra-Saalian interglacial environment. As these assemblages were probably all formed in the same climatic optimum, it can be suggested that some of the inter-site differences are the result of cultural site formation processes. The variability may, for example, be due to the kind of activities performed at certain places. Flint procurement and/or testing, flake and/or tool production, tool- and/or core-edge rejuvenation and food (meat) procurement can be mentioned. Directly related to these activities could be the manner in which early humans anticipated the situations they came across. An expedient (*ad hoc*) production and use of technology can show completely different archaeological patterns than a transported ('curated') technology. Geneste (1985, 1988), for example, has described such a binary pattern in his regional study of the Middle Palaeolithic Aquitaine area (France). Other factors responsible for variations could be the number of (different) activities involved, the number of (different) visits, the duration of activities and the number of people involved. Archaeological proof for the last two factors is probably the most difficult, or even impossible, to find.

At Belvédère distinct differences in the used core reduction strategies are described. These technological approaches range from a very well-prepared *Levallois recurrent* reduction at Site C to a more 'wasteful' reduction of non-prepared disc/discoidal cores at Sites F, H and K. Although these differences are 'easy' to spot, they are difficult to quantify. This is amongst others one of the reasons why much time and energy was spent in creating and executing the very detailed lithic analysis (Schlanger and De Loecker 1992; Appendices 1 to 11) in support of the conjoining study.

In the next sections the variation (and resemblance) between the previously described Unit IV findspots (see Chapters 3 and 4) will be studied. However, there are some analytical research limitations concerning this inter-assemblage study which will be discussed first.

5.4.2 *A survey of research limitations*

Before the individual assemblages are compared, we will have to deal with the presence of certain limitations which could influence the outcome of the study. These limitations are especially connected with differences in site preservation, contemporaneity of the artefacts, excavation techniques and the amount of excavated surface. Directly related to the latter is the degree to which empty square metres were incorporated in the analysis. This becomes especially important when mean artefact densities (per square metre) are calculated. Although these limitations are sometimes difficult or impossible to overcome, they have been considered in the analysis. In other words an effort has been made to 'calibrate' the assemblages for comparison.

First of all, the documentation of the archaeological occurrences at Belvédère were always the result of a compromise between the goals of the commercial exploiter of the pit and the research aims. Moreover, from 1986 onwards the emphasis was on the documentation of large surfaces, instead of focusing on a very detailed documentation of small areas. Sites A, B, C, D, F, G and N were excavated using a detailed three-dimensional documentation of the finds, while at Sites H and K the artefacts were recovered in a totally different way. As only a limited period of time was available to excavate, a general documentation of an area as large as possible was chosen. Due to the large quantities and the clustered appearance, finds were collected by metre squares and to a lesser extent (at Site K) by quarters of a metre square. Smaller areas inside these excavated areas were documented three dimensionally, in order to obtain a more detailed picture of the horizontal and vertical distribution of the finds.

Secondly, besides the cultural site formation processes (see later) there are a number of post-depositional factors which may have been responsible for the site differences. The results from different excavated findspots (and geological units) indicate that part of the archaeological data is missing. This applies especially to the organic material. The lower Unit IV-B sediments (Sites B, C and G) contained a large number of faunal remains, while no significant mammal remnants were recovered from the Unit IV-C-ß sites (A, D, F, H, K and N). The latter is mainly a consequence of decalcification of the site matrix.

Thirdly, at some of the Belvédère sites a certain amount of the smaller artefact fraction is missing as well. To evaluate the kind of processes involved, it is necessary to compare the archaeological dataset with complete experimentally produced assemblages. For this analysis the work of Schick (1986, 1987) was consulted.

During the late 1970s and early 1980s Schick and Toth (Schick 1986) performed a series of 107 separate tool manufacturing experiments to develop a set of expectations regarding the characteristics of knapping residues. Hard hammer percussion was used, while the end products of the flaking episodes were artefacts characteristic of Early and Middle Palaeolithic assemblages. Regardless of the stone knapping target or technology a large quantity of flaking debris, in the form of minute, amorphous fragments of shattered or broken flakes, was usually produced in the experimental flaking process. Every sample was screened using a 5 mm mesh sieve. Besides the lost lithic 'dust' or micro-debitage (<1 mm, *cf*. Fladmark 1982), most of the debris (ranging from approximately 60.0% to 75.0%) consisted of the smaller elements of the macro-debitage <20 mm. The largest flakes reached a maximum dimension of ca. 200 mm. Besides some minor variations, the result is remarkably constant for a variety of raw materials. The experiments showed that large quantities of small size debitage result directly from the mechanism of stone fracture during the process of detaching flakes from cores (and/or bifaces): each blow produces not only a flake but also a whole range of fragments as by-products.

If we compare the experimentally collected data of Schick and Toth (Schick 1986) with the Maastricht-Belvédère results, the following statements can be made. The size distribution curves of Sites K, H, and F are essentially identical except for the smaller 'spalls' and some irregularities (see Figure 5.1-A and -B). The 'minor' quantity of artefacts <20 mm, and especially artefacts <10 mm, at Site K (respectively 51.7% and 16.2%) and H (respectively 42.2% and 7.6%) could for a large part be explained by the chosen excavation strategy, *i.e.* finds collected in metres square and in quarters of metre squares. This faster way of excavating also meant a loss of information, including very small artefacts. Besides that, no screening procedures were executed at these findspots (*cf*. Schick 1986). The minor irregularities in the Site H curve can probably be explained by the fact that only a certain area of the cluster was excavated, while a major part of the original assemblage was lost. Also at the well-excavated Site F (three-dimensional recording) only part of the original concentrated flint scatter could be excavated. In general the horizontal distribution of the artefacts does not point to post-depositional sorting processes, as pieces <10 mm randomly occur among the larger ones. Refitting, however, showed that the Site F flint distribution was probably slightly rearranged by fluvial activities. A total of 74.1% of the artefacts has a maximum dimension <20 mm. These are amongst the highest rates at Belvédère. The smaller sized artefacts (36.9% of the artefacts is <10 mm) are more dominant than in Schick's 107 manufacturing experiments. The curve is furthermore nearly identical to Site K and Schick's (1986) experiment. The three-dimensionally recorded Site G also shows a 'Schick-like'

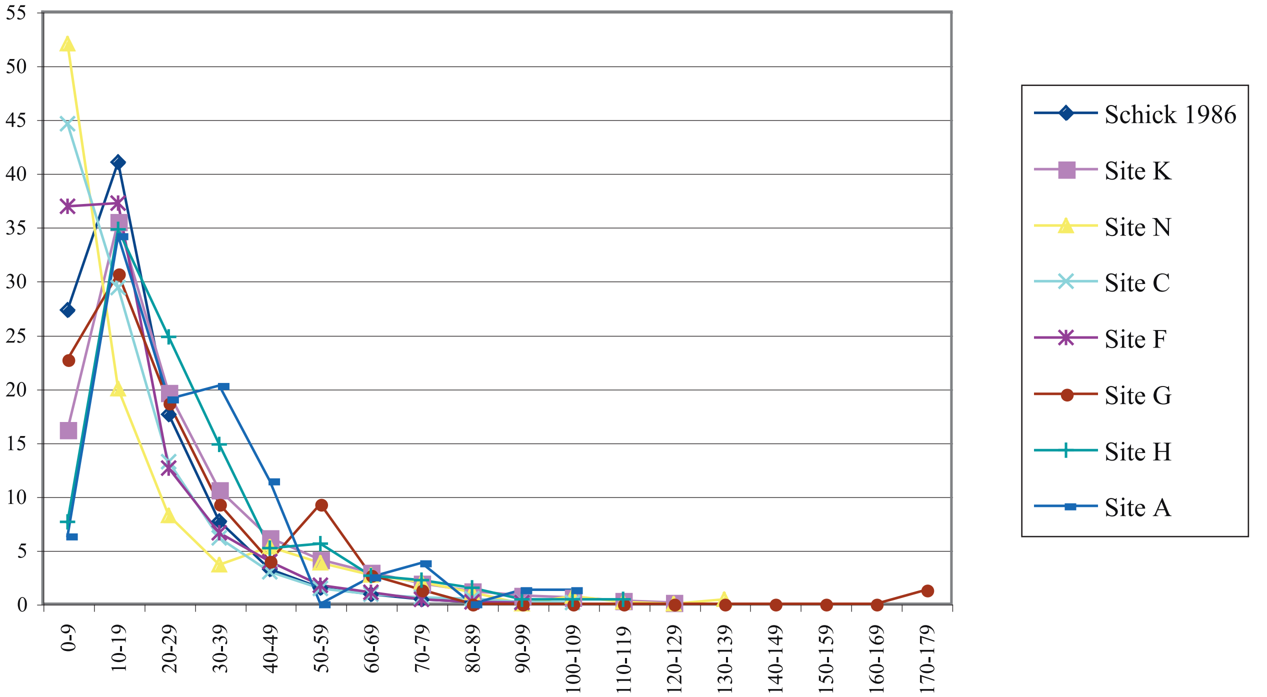
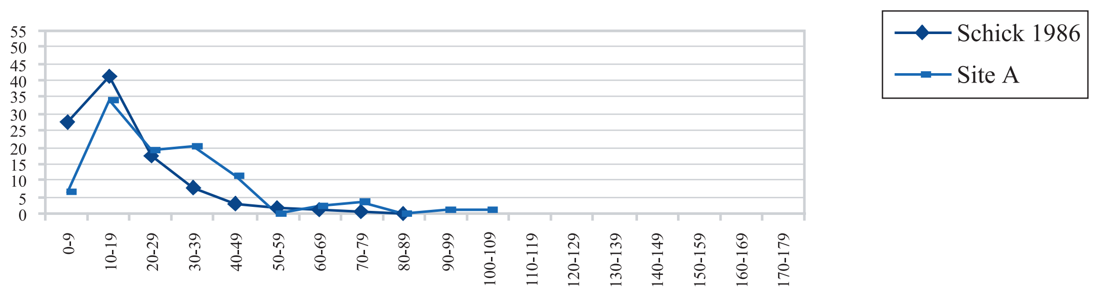
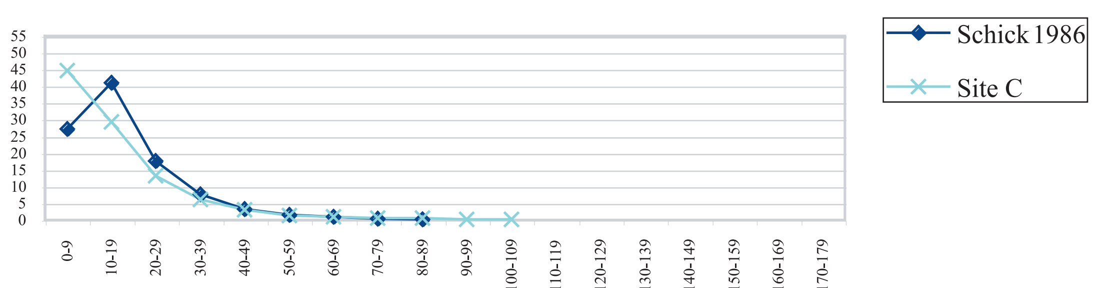


Figure 5.1-A: Maastricht-Belvédère. Size class distribution of some Saalian Unit IV assemblages, without the cores (Sites A, C, F, G, H, K and N). The figures are based on maximum dimensions and compared with the mean size distribution of the 107 experimental flaking residues of Schick and Toth (Schick 1986). For details the reader is referred to Table 5.1-B and Appendices 2 up to 11.





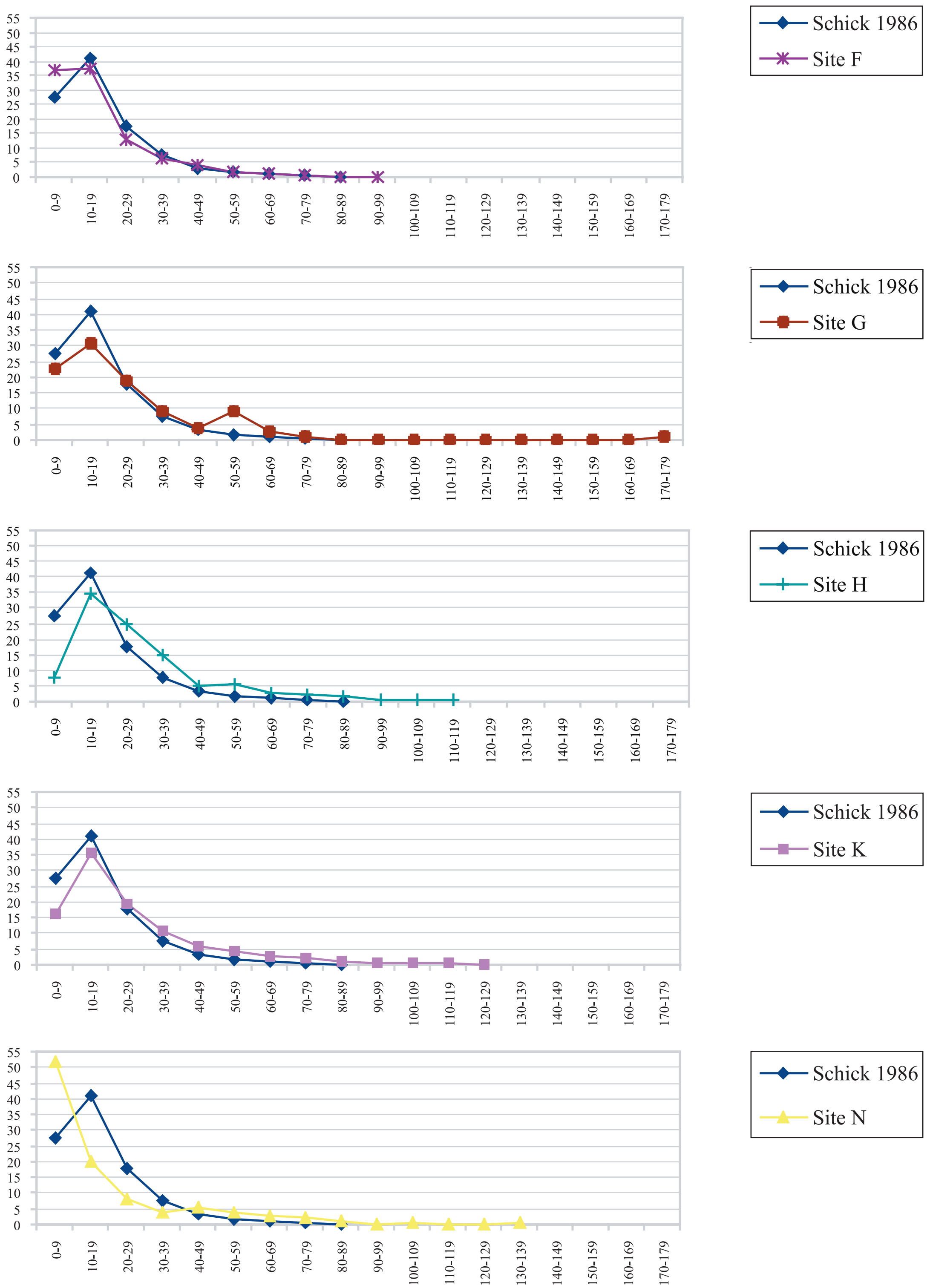


Figure 5.1-B: Maastricht-Belvédère. Size class distribution of the Site A, C, F, G, H, K and N assemblages (presented separately), without the cores. The figures are based on maximum dimensions and compared with the mean size distribution of the 107 experimental flaking residues of Schick and Toth (Schick 1986).

distribution, although the peak of spalls <20 mm (53.4%) and <10 mm (22.7%) is less pronounced. More conspicuous is the fact that flakes measuring about 50 mm (9.3%) represent a second peak in the distribution. Compared to the size distribution of the experiments, Sites C and N (three-dimensionally recorded) show a different curve. The percentages of flakes <20 mm, and especially artefacts <10 mm, are the highest at Belvédère, respectively 74.0% and 44.6% at Site C and 72.0% and 52.0% at Site N. Here flakes <10 mm clearly represent the highest peak in the curve and than the curve drops sharply under 7.0% for artefacts measuring 30 mm or larger. Like Site G, the Site N curve shows some irregularities for flakes measuring >30 mm. In the evaluation of the size variations between Sites F, G, C and N, the excavation technique (being the same) can be left out of consideration. The differences and irregularities (Sites G and N) can therefore possibly be explained in technological or behavioural terms.

Following Schick (1986), the Belvédère assemblages show in general size class distributions which clearly point to loci where fluviatile winnowing processes only 'slightly' influenced the flint occurrences. Besides differences in behavioural activities, part of the variations could have been caused by the amount of excavated surface, *e.g.* partly excavated flint clusters (Sites F and H) *versus* the recording of more 'complete' concentrated flint assemblages (Sites C and K). The used excavation method certainly played a role, but probably a minor one.

Fourthly, the lack of sedimentation episodes between a number of repeated visits (artefact depositions) at the same location precludes a differentiation between several behavioural episodes. Individual flint scatters within a certain findspot may therefore be exclusively the result of one consistent use of a space, or an accumulation of several independent and unrelated 'short' visits over time. A palimpsest scenario is for example assumed for the 'low' find distributions at Sites G and N (Roebroeks *et al*. 1992). Here a complex and cumulative process of discarding flakes, core(s) and tools during several unrelated and 'short' visits is suggested. This is possibly also the case for the larger Site C. Although these finds are more clustered, and therefore show a completely different horizontal distribution than at Sites G and N, we are possibly dealing here with the remnants of several behavioural episodes. Refitting and spatial data showed that at least two phases of flint knapping were chronologically separated by a period of fire (Roebroeks 1988). Only at the large Site K cluster we have some good arguments to suggest that most of the finds were deposited in 'one' consistent and continuous use of the place. Positive proof of 'contemporaneity' is given by the homogeneity of the used technology, typology, the large quantity of inter-locus refits and the 'uniformity' of the intra-site spatial patterning (see Section 3.10.2). Generally, the high resolution Site K assemblage suggests that the findspot was a more 'organized' entity on an 'organised - compound' continuum (*cf*. Kroll and Isaac 1984; Roebroeks 1988). Site C and especially Sites G and N might represent 'compound' entities which could have been accumulated over minutes, hours, months, years or even hundreds of years.

A fifth limitation to analysis is related to the differences in the amount of excavated surface. Due to commercial quarrying, most of the Belvédère flint scatters were excavated under considerable time pressure. This sometimes resulted in the frustrating fact that only parts of certain flint clusters could be excavated, while other rich areas of the same findspot were quarried away. A loss of information due to time pressure was for example experienced at Site K and especially at Sites H and F (and the Weichselian Site J; Roebroeks *et al*. 1987*a* and *b*, 1997). In general it can be stressed that when more or larger (fewer or smaller) surfaces had been excavated, the analytical outcome would probably have been different. This applies to Sites A, B, D, 'July 1990', L, M, O and Site N (Level X) not only regarding the quantity of recovered finds but also regarding the recorded spatial patterns. It can therefore be suggested that for the latter findspots the presented site interpretations are directly related to the small amount of excavated surface. It also has to be mentioned that, regardless of the quantity of artefacts, every excavated metre square (or part of it) was incorporated in the site analysis.

5.4.3 Inter-assemblage variability: a comparison of the data

5.4.3.1 Introduction

The long-lasting excavations at Maastricht-Belvédère provided a unique opportunity to examine the nature of variation, in terms of technology, typology and spatial distribution, within the local Saalian record. Moreover, the 'controlled' excavation strategies ensured rather good artefact recovery, justifying a comparison of the several assemblages. It has already been explained in Section 5.4.2 that we have to be careful, however, with comparing quantities or size distributions, as some of the sites were excavated under much more time pressure than others.

In order to 'tackle' the inter-site differences in a less 'impressionistic' way, the recovered assemblages were submitted to a very detailed and systematic lithic analysis (Schlanger and De Loecker 1992; Appendices 1 to 11). Tables 5.1 to 5.20 give a detailed overview of the assemblage quantities, mean measurements and ratios. Moreover, these tables clearly provide and quantify the evidence for fine-tuned inter-site differences.

An important factor contributing to this inter-assemblage variability seems to be transport of lithics between certain areas (sites). At almost all excavated surfaces a number of transported cores, blanks and/or tools has been used(?) and/or discarded in combination with on-site produced items. Some of the findspots show a high percentage of artefacts made on locally procured raw materials (Sites F, H and K), while at other 'sites' large quantities of flakes were produced from transported cores (Site C). At yet other assemblages the artefacts consist only of transported flint and the local knapping activities were limited (Sites G and N). This illustrates the fact that also within the assemblages there may be a considerable amount of variability. Especially the Site C analysis demonstrated that various flint nodules were reduced by means of different core approaches (a *débitage Levallois recurrent versus* a disc/discoidal core reduction). Moreover these flaking modes seem to have been executed on distinct flint 'qualities' ('fine' *versus* 'coarse' grained). All this may reflect different ways of organizing flint working in anticipation of given problems at certain localities. Although these internal variations are well documented in the several site publications (*cf*. Roebroeks 1988; Schlanger 1994; De Loecker 1992), they become more blurred when we start comparing assemblages with one another. This is especially the case where mean measurements and ratios are used for a general characterization of the lithic material. It can also be seen as another limitation of this specific study (see also Section 5.4.2).

In the next sections the Saalian Belvédère assemblages are compared and the inter-site differences, or resemblances, will be described. This part of the analysis starts with an examination of the basic site variations. Subsequently, we will focus on debitage specific differences, while a tool-orientated comparison is presented in a following section. It also has to be mentioned that data recovered from the small-scale excavations, test pits and section finds will only be used sporadically. These assemblages contain very low numbers of artefacts. This applies to Sites A, B, D, L, M, O, N (Level X), and the 'July 1990' test pit.

5.4.3.2 Comparison of the basic assemblage variations. As mentioned before, the Unit IV assemblages were geologically 'sealed' by more or less the same sedimentary regimes: they were recovered from fluvial low-energy deposits. Although there are some 'conservation' differences (*cf*. Site F *versus* Site K), it can generally be stated that the Saalian find distributions were subjected to minimal post-depositional disturbance. The excavated find configurations might therefore reflect different spatial aspects of technology. If we compare the Belvédère assemblages, distinct differences in the horizontal 'lay-out' of the recovered find distributions are noticed. For illustrations of the spatial distribution maps of the several excavated surfaces the reader is referred to Roebroeks (1988), Roebroeks *et al*. (1992) and Chapter 3 (*i.e*. Site K). First there are a number of findspots with dense clustered appearances of archaeological remains. Some of these consist of 'one' large find concentration, like at Sites F and K and possibly also at Site H, while others (Site C) are composed of several 'smaller' clusters situated at close distance to one another. The assemblage sizes vary between 1,177 artefacts at Site F, 3,067 pieces at Site C, to 10,912 finds at Site K (Table 5.1). The quantity for Site H is considerably lower (270 artefacts). At most of these findspots, however, only part of the cluster(s) were excavated. The mean artefact densities for these surfaces can be described as relatively high (Table 5.1). They range from 11.6 artefacts per metre square at Site C to 29.5 and 28 artefacts at respectively Sites K and F. The average artefact density for Site H is 5. Divided into different typological groups (chips <30 mm, flakes, blade-like flakes, chunks, burned artefacts, cores, 'core trimming elements' and tools) these clustered artefact appearances still result in the highest mean densities. Generally it seems that Sites K and F, directly followed by Site C, always show the highest values at Belvédère. The densities for Site H are slightly lower. The mean tool density at Site C is more in line with the Site N distribution.

A completely different kind of artefact configuration was excavated at Sites G and N (respectively 75 and 450 artefacts). Here the horizontal distribution shows no clear clustered appearance of archaeological remains. The finds were recovered as isolated items, or as very small groups which sporadically could be conjoined (*cf*. Site N). Seemingly no major changes would have occurred in the spatial patterns if we had excavated larger or more areas of this type (Roebroeks *et al*. 1992). The mean artefact densities per metre square at Site G (1.5), and especially at Site N (ca. 0.6), are the lowest within the Saalian Belvédère sample (Table 5.1). The figure for the 'July 1990' test pit (ca. 2.1) is somewhat higher. For the different typological groups the same low density patterns are described: Site N, followed by Site G, scoring the lowest values. The average Site G tool density is, however, comparable to the ones of Sites F and H.

Generally it can be stated that Site N and Site K represent two ends of a continuum of artefact densities. More details on the mean densities of different find categories can be found in Table 5.1.

Before the Belvédère assemblages are further compared, in terms of distinct quantitative and technological differences, some remarks regarding the used raw materials will be made. At all Unit IV findspots the majority of recovered artefacts show fluvially abraded cortex, indicating that the raw materials were probably collected from nearby river deposits (Roebroeks 1988). According to specific properties, like texture, cortex, fossil inclusions and 'colour', a relatively

Site	Area dug (m^2)	Total number of artefacts	Density per square metre: Total number of artefacts	Chips <30 mm	Flaked artefacts ≥30 mm	Flakes	Blade-like flakes	Chunks	Burned artefacts
A	5	80[2]	16.0/6.8	9.4	6.4	6.0	0.2	0.2	0.2
B	20	6	0.3	–	0.3	0.25	0.05	–	–
C	264	3,067	11.61	10.11[3]	1.5[3]	1.48[3]	–[4]	0.071[4]	0.5[4]
D	–	11	–	–	–	–	–	–	–
F	42	1,177	28.0	24.28	3.69	3.19	0.14	0.35	0.35
G	50[1]	75	1.5/1.22	1.06/0.89	0.44/0.36	0.4/0.32	0.02/0.016	0.02/0.016	–
H	54	270	5.0	3.33	1.66	1.55	0.055	0.055	0.018
K	370	10,912	29.49	20.96	8.27	8.01	0.17	0.091	1.66
N	765	450	0.58	0.47	0.11	0.11	0.0013	–	0.0013
July ’90	7	15	2.14	1.14	1.0	1.0	–	–	–
L	–	8	–	–	–	–	–	–	–
M	–	44	–	–	–	–	–	–	–
O	–	10	–	–	–	–	–	–	–
Site N: Level X	–	29	–	–	–	–	–	–	–
Section finds	–	67	–	–	–	–	–	–	–

Site	Area dug (m^2)	Total number of artefacts	Density per square metre: Cores	Core Trimming Elements *sensu sticto*	Tools	Tools *sensu stricto*	Long Sharpening Flakes	Transversal Sharpening Flakes
A	5	80[2]	0.2	0.4	0.4	0.2	–	0.2
B	20	6	–	–	–	–	–	–
C	264	3,067	0.015[3]	0.05[4]	0.087	0.018	–	–
D	–	11	–	–	–	–	–	–
F	42	1,177	0.047	0.12	0.19	0.071	–	–
G	50[1]	75	–	–	0.16/0.13	0.06/0.049	–	0.02/0.016
H	54	270	–	–	0.19	0.074	–	–
K	370	10,912	0.25	0.27	0.37	0.3	0.0027	0.0027
N	765	450	0.0013	0.0026	0.033	0.016	–	–
July ’90	7	15	–	–	0.14	0.14	–	–
L	–	8	–	–	–	–	–	–
M	–	44	–	–	–	–	–	–
O	–	10	–	–	–	–	–	–
Site N: Level X	–	29	–	–	–	–	–	–
Section finds	–	67	–	–	–	–	–	–

Table 5.1: Maastricht-Belvédère. A comparison (basic count) of the Unit IV primary context sites and section/test pit assemblages.

[1] The excavated Site G area together with the test pit measures 61 m^2.
[2] Within the excavated Site A area only 34 artefacts were found.
[3] Site C figures after Roebroeks (1988; n= 3,067).
[4] Site C figures after Schlanger’s sample (1994; n= 1,438).

homogeneous group of Rijckholt/Valkenburg-like flint dominates the assemblages. Moreover, part of these artefacts show a heavy patination. As a result it was very difficult, or even impossible, to ascribe individual artefacts to specific flint nodules (or types), unless refitting was involved (*cf.* Sites C, F, H and K). Generally, only few artefacts from the Belvédère sample deviate from this main flint characterization. For example at Site K, a number of items (mainly tools) were produced on 'exotic' flint[1], an assessment supported by the negative refitting results. These items were interpreted as imported. More striking are the results of raw material analyses at Sites G and N. At these 'low density' find distributions many artefacts represent different flint nodules/types. These assemblages are therefore very heterogeneous in raw material composition and show a wide variety of colour, texture, inclusions and cortex. Moreover, the refitting percentages (*Aufeinanderpassungen*, *cf.* Cziesla 1986, 1990; see later) are strikingly low and the completely excavated assemblages are interpreted as transported.

Although the 'exotic' artefacts at Belvédère are interpreted as imported items, it gives only little, or no, information on transport distances. In general the Pleistocene gravel beds of the river Meuse contain pebbles of several different flint types, *e.g.* Rijckholt and Valkenburg, and may have included the 'exotics'.

5.4.3.3 Debitage specific inter-assemblage variations

Except for some possible soft hammer flakes at Site C (Roebroeks 1988), the complete Saalian Unit IV assemblage represents hard hammer percussion. Moreover, technology was only orientated towards the reduction of cores or better towards the production of flakes. Evidence for the use of a bifacial technology is completely absent, as no handaxes or handaxe-related artefacts ('handaxe sharpening flakes', tranchet flakes) were recovered. In that sense the Belvédère data is rather homogeneous. The detailed inter-site analysis shows, however, that between the several assemblages there are some fine-grained differences with regard to the various characterizations of flint debitage.

As mentioned before some excavated surfaces contain higher mean densities of artefacts than others (*e.g.* Sites F and K *versus* G and N). When we examine the percentages of flaked artefacts ≥30 mm, a difference between Sites H, G and K, on the one hand, and Sites N, F and C, on the other, is noticed (Table 5.2). The first group of findspots shows values between 28.1% at site K and 33.3% at Site H. For Site N the quantity of flaked artefacts ≥30 mm is only 19.9%, while at Sites F and C the numbers are considerably lower (respectively 13.2% and 12.8%). These differences in percentages are for a major part the result of the presence, or absence, of large quantities of chips <30 mm. Especially the very small sized debitage (<10 mm) seems to influence the variability. The latter is very common at Sites F, C and N (respectively 36.9%, 44.6% and 52%), while rather 'scarce' at Sites G (22.7%), K (16.2%) and H (7.6%). This is partly a consequence of the excavation strategy. For more details on the size class distributions the reader is referred to Section 5.4.2 and Figure 5.1.

Table 5.2 also shows that when only flakes ≥30 mm are studied (excluding the blade-like flakes and chunks), the same variation between the same groups of assemblages can be described. Due to the small numbers of blade-like flakes and chunks the figures are probably not sufficient for a meaningful inter-site comparison. At most it can be said that these items mainly occur at the clustered find occurrences where there are high densities of flaking debris, *e.g.* at Sites C and H, and mainly at Sites F and K. They can therefore be interpreted as 'lucky shots' and errors which appeared during core reduction. The limited number of 'blades' also indicate that technology at Belvédère was certainly not orientated towards a *débitage laminaire* (*cf.* Révillion and Tuffreau 1994).

Generally, very few cores and/or 'core trimming elements' were recovered from the Saalian find occurrences (Table 5.2). If these artefacts were found at all, they appear mainly at the 'high density' distributions. The numbers vary between 1 and 4 for cores and 2 and 5 for 'core trimming elements'. As an exception Site K has to be mentioned. Here a total of 91 (0.8%) cores and 101 (0.9%) 'core trimming elements' was excavated.

For tools the situation seems to be completely different. Although the highest number of tools was found at Site K (n= 137), they represent one of the lowest percentages at Belvédère (1.3%). Only at Sites C and F are the values lower (each 0.7%). Conspicuously, the highest tool percentages are found in the 'low density' Site N and G artefact distributions (respectively 5.6% and 10.7%). The Site H data occupies an intermediate position. A comparable distribution applies to tools *sensu stricto* as well as for pieces with macroscopic signs of use. Site G, followed by Site N, always shows the highest percentages (see Table 5.2 for more details).

A different approach to these specific inter-site variations is given by the calculated ratios. Table 5.3 shows that the lowest tool/waste ratios are represented by the 'low density' find distributions at Sites G (1:8) and N (1:16), while the 'high density' clusters have a considerably higher ratio. The numbers vary between 1:79 for Site K to 1:146 for Site F. The Site H ratio (1:26) again occupies an intermediate position between the two previously mentioned groups. A nearly identical distribution is given for the tool *sensu stricto*/waste ratios (see Table 5.3). Due to the large quantity of cores, Site K shows the lowest core/waste ratio (1:117), while the figures for Sites N, F and C are respectively 1:423, 1:584 and 1:760. Moreover the 'high density' Site K, F and C findspots clearly have the lowest core/tool ratios:

Site	Area dug (m^2)	Total number of artefacts	Chips <30 mm		Flaked artefacts ≥30 mm		Flakes		Blade-like flakes		Chunks		Burned artefacts	
			n	%	n	%	n	%	n	%	n	%	n	%
A	5	80[2]	47	58.8	32	40.0	30	37.5	1	1.3	1	1.3	1	1.3
B	20	6	–	–	6	100.0	5	83.3	1	16.7	–	–	–	–
C	264	3,067[3]	2,670[3]	87.1[3]	393[3]	12.8[3]	393[3]	12.8[3]	–	–	–[3]	–[3]	132[3]	4.3[3]
		1,438[4]	972[4]	67.6[4]	462[4]	32.1[4]	443[4]	30.8[4]	–	–	19[4]	1.3[4]	–[4]	–[4]
D	–	11	3	27.3	7	63.6	7	63.6	–	–	–	–	–	–
F	42	1,177	1,020	87.7	155	13.2	134	11.4	6	0.5	15	1.3	15	1.3
G	50[1]	75	53	70.0	22	29.9	20	26.7	1	1.3	1	1.3	–	–
H	54	270	180	66.7	90	33.3	84	31.1	3	1.1	3	1.1	1	0.4
K	370	10,912	7,758	71.1	3,063	28.1	2,966	27.2	63	0.6	34	0.3	617	5.7
N	765	450	361	80.2	88	19.9	87	19.3	1	0.2	–	–	1	0.2
July '90	7	15	8	53.3	7	46.7	7	46.7	–	–	–	–	–	–
L	–	8	5	62.5	3	37.5	3	37.	–	–	–	–	–	–
M	–	44	15	34.1	29	65.9	26	59.1	3	6.8	–	–	–	–
O	–	10	3	30.0	7	70.0	7	70.0	–	–	–	–	–	–
Site N: Level X	–	29	9	31.0	16	55.2	20	69.0	–	–	–	–	–	–
Section finds	–	67	24	35.8	42	62.7	40	59.7	2	3.0	–	–	–	–

Site	Area dug (m^2)	Total number of artefacts	Cores		Core Trimming Elements *sensu stricto*		Tools		Tools *sensu stricto*		Macroscopic signs of use		Long Sharpening Flakes		Transversal Sharpening Flakes	
			n	%	n	%	n	%	n	%	n	%	n	%	n	%
A	5	80[2]	1	1.3	2	2.5	2	2.5	1	1.3	1	1.3	–	–	1	1.3
B	20	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–
C	264	3,067[3]	4[3]	0.1[3]	–[3]	–[3]	23[5]	0.7[5]	5[5]	0.2[5]	18[5]	0.6[5]	–[5]	–[5]	–[5]	–[5]
		1,438[4]	4[4]	0.3[4]	12[4]	0.4[4]										
D	–	11	1	9.1	–	–	–	–	–	–	–	–	–	–	–	–
F	42	1,177	2	0.2	5	0.4	8	0.7	3	0.3	5	0.4	–	–	–	–
G	50[1]	75	–	–	–	–	8	10.7	3	4.0	5	6.7	–	–	1	1.3
H	54	270	–	–	–	–	10	3.7	4	1.5	6	2.2	–	–	–	–
K	370	10,912	91	0.8	101	0.9	137	1.3	111	1.0	26	0.2	1	0.01	1	0.01
N	765	450	1	0.2	2	0.4	26	5.6	12	2.7	14	3.1	–	–	–	–
July '90	7	15	–	–	–	–	1	6.7	1	6.7	–	–	–	–	–	–
L	–	8	–	–	–	–	–	–	–	–	–	–	–	–	–	–
M	–	44	–	–	–	–	3	6.8	2	4.5	1	2.3	–	–	–	–
O	–	10	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Site N: Level X	–	29	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Section finds	–	67	1	1.5	–	–	4	5.9	3	4.5	1	1.5	–	–	–	–

Table 5.2: Maastricht-Belvédère. A comparison (basic count) of the Unit IV primary context sites and section/test pit assemblages.

[1] The excavated Site G area together with the test pit measures 61 m^2.
[2] Within the excavated Site A area only 34 artefacts were found.
[3] Site C figures after Roebroeks (1988; n= 3,067).
[4] Site C figures after Schlanger's sample (1994; n= 1,438).
[5] Site C figures after this lithic exercise. The percentages are calculated according to Roebroeks' (1988) total number of artefacts.

Area		Number of artefacts					Ratio			
Site	Area dug (m^2)	All tools and fragments	Tools and fragments *sensu stricto*	Cores	Flakes and chips	Total	Tool: waste	Tool *sensu stricto*: waste	Core: waste	Core: tool
A	5	2	1	1	77	80[2]	1:39	1:78	1:77	1:2
B	20	–	–	–	6	6	–	–	–	–
C	264	23	5	4	3,040	3,067[3]	1:132	1:609	1:760	1:6
D	–	–	–	1	10	11	–	–	1:10	–
F	42	8	3	2	1.167	1,177	1:146	1:389	1:584	1:4
G	50[1]	8	3	–	67	75	1:8	1:22	–	–
H	54	10	4	–	260	270	1:26	1:65	–	–
K	370	137	111	91	10,684	10,912	1:79	1;97	1:117	1:2
N	765	26	12	1	423	450	1:16	1:35	1:423	1:26
July '90	7	1	1	–	14	15	1:14	1:14	–	–
L	–	–	–	–	8	8	–	–	–	–
M	–	3	2	–	41	44	1:14	1:21	–	–
O	–	–	–	–	10	10	–	–	–	–
Site N: Level X	–	–	–	–	29	29	–	–	–	–
Section finds	–	4	3	1	62	67	1:16	1:21	1:62	1:4

Table 5.3: Maastricht-Belvédère. A comparison (basic count and ratios) of the Unit IV primary context sites and section/test pit assemblages.

[1] The excavated Site G area together with the test pit measures 61 m^2.
[2] Within the excavated Site A area only 34 artefacts were found.
[3] Site C figures after Roebroeks (1988; n= 3,067).

respectively 1:2, 1:4 and 1:6. For the 'low density' Site N assemblage the value is slightly higher (1:26).

Inter-assemblage variations are also notable when the mean metrical data is compared (Table 5.4). According to the average maximum dimensions for flakes ≥30 mm, the 'low density' Site G, and especially the Site N scatter, show the largest measurements (respectively 52.1 mm and 57 mm). At Site K the mean value (51.5 mm) is comparable to the one of Site G, while for the other 'high density' patches the figures are lower: between 48.5 mm at Site C and 44.5 mm at Site F.

A nearly identical distribution is given for the mean length of all (and all complete) flakes ≥30 mm. The latter table also shows that the complete Site G flakes are on average somewhat larger than the Site N ones (see Table 5.4 for details). Except for Site K (39.6 mm), the widest flakes are again described at the 'low density' Site N and G findspots, respectively 38.7 mm and 37.6 mm. The average Site H, F and C values are between 32.8 mm and 31.7 mm.

Sites K (11.1 mm) and N (9.3 mm) furthermore show the highest mean measurements for thickness, while the thinnest means were recorded at Site G (8.6 mm) and Site C (7.2 mm). Generally it can be concluded that the 'low density' scatters show the largest mean measurements, directly followed by the 'high density' Site K findspot. The average measurements for the other patches are somewhat smaller. The mean measurements for the section finds are among the highest values at Belvédère (Table 5.4). Compared with Sites G and N, this could indicate that most of these flakes represent the isolated remnants of the continuous and widespread 'low density' scatter of artefacts. Moreover, if these 'low density' find distributions are correctly interpreted as mainly transported 'toolkits', the emphasis was clearly on the use of large and wide flakes.

Table 5.5 shows the mean flake volume, the elongated index and the massivity index, which are calculated using the average measurements of Table 5.4. The table indicates that Site K, directly followed by Sites N and G, has the most voluminous flakes (respectively 1960.4 mm^3, 1846.3 mm^3 and 1484.2 mm^3). The flake volumes for Sites F and H are nearly identical, while the Site C flakes show the smallest volume (947.2 mm^3). The elongated index shows on the one hand that the 'low density' Site N (132.6) and G (122.1) scatter, together with Site C (130.9), have the highest values. The Site K patch, on the other hand, is represented by the lowest index (112.6). The massivity index gives a totally different picture. The 'high density' Site K, F and H assemblages represent the highest values (respectively 24.9, 23.5 and 23.4), while the figures for Sites G and N are considerably lower (18.7 and 18.1). The Site C massivity index is one of the lowest at Belvédère (17.3). The mean flake volume, elongated index and massivity index of the section finds are again amongst the highest.

The cortex percentages for all flakes (Table 5.6) also show a clear difference between the 'high' and 'low density' artefact distributions. At Sites C, H and K the percentages range respectively from 16.6% and 21.5% to 32.2%. The figures for Sites N (15.4%) and G (12%) are amongst the lowest in the Belvédère sample. Only the Site F 'high density' distribution can be seen as an exception (11.6%). For flakes with 25% cortex or more the lowest percentages are again recorded at Sites G (5.3%) and N (4.9%), while Site K still has the highest percentage (14.8%). If after decortication the raw material at Site K had been dealt with more 'economically' (smaller and thinner flakes), the percentage of cortex flakes would have been remarkably smaller. Compare for example the non-cortex/cortex flake-index of Site K (2.1) with that of Site C (5.0). At the latter findspot, the 'same' humans under very similar conditions obviously dealt with the raw material in a different and less wasteful way. The index differences between Site K and the 'low density' scatters at Sites N (5.5) and G (7.3) can largely be explained by the presence or absence of flaking activities, and specifically the primary flint knapping (decortication) stages. The cortex percentages for all flakes ≥30 mm show in general the same distribution as for all artefacts. As a exception Site N can be mentioned. This assemblage represents one of the highest figures (36.3%) at Belvédère. However, most of these flakes have less than 25% cortex. For more details the reader is referred to Table 5.6.

A differentiation between 'high' and 'low' density scatters is also described for the amount of natural fissure surfaces on flakes (Table 5.6). Percentage-wise these fissures, already present in the flint before knapping, appear most frequently at Sites F, H and K (respectively 42%, 38.9% and 25.9%), while lower values were recorded at Site G (22.7%) and especially at Site N (5.7%). According to Schlanger's sample, natural fissures appear only sporadically at Site C (2.7%). Only the 'high density' patches (Sites K, H, F and C) consist of flakes with more than 25% natural fissures. Altogether the high percentages of rather 'fresh' natural fissures could be indicative of an unselective choice of raw material or a lack of 'high' quality raw material. The fact that the lowest percentages were described at the 'low density' findspots could, on the one hand, be explained by the absence of major flaking activities. On the other hand it could suggest that better quality blanks were selected for transport and/or use. Transportation of 'good' quality raw materials could probably also explain the low natural fissure percentage at Site C.

Site	Mean measurements of flakes ≥30 mm									
	Maximum dimension		Length		Length complete flakes		Width		Thickness	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
A	45.3	18.9	41.2	19.6	44.4	23.1	32.2	13.0	8.5	5.0
B	51.8	13.0	49.5	12.7	50.3	4.9	33.5	12.5	8.3	2.9
C	48.5[1]	18.5[1]	41.5[1]	21.1[1]	41.6[1]	21.9[1]	31.7[1]	15.9[1]	7.2[1]	5.3[1]
D	38.3	5.6	35.0	6.1	33.5	5.3	28.0	7.2	5.7	2.5
F	44.5	12.7	38.8	13.0	41.8	13.1	32.2	11.4	9.1	5.8
G	52.1	29.7	45.9	32.3	58.3	41.9	37.6	18.2	8.6	5.0
H	48.0	18.7	38.4	20.9	45.1	16.5	32.8	15.7	9.0	6.0
K	51.5	20.4	44.6	20.2	48.9	21.4	39.6	16.7	11.1	7.1
N	57.0	22.0	51.3	24.4	55.8	20.0	38.7	14.4	9.3	4.3
July '90	47.7	8.8	45.1	9.0	43.2	10.1	28.3	6.8	7.0	3.4
L	40.3	14.4	38.7	15.9	29.5	0.7	29.3	11.0	6.0	2.0
M	49.9	23.1	44.8	25.6	48.1	34.5	36.9	10.8	7.9	3.2
O	55.1	21.3	53.2	25.6	48.1	31.2	48.7	12.3	14.2	7.5
Site N: Level X	52.2	14.9	44.2	15.7	44.3	16.7	44.9	16.0	12.1	6.6
Section finds	55.7	18.7	50.4	19.5	56.1	20.2	41.1	13.1	11.6	6.4

Table 5.4: Maastricht-Belvédère. A comparison of the average measurements of the Unit IV primary context sites and section/test pit assemblages. S.D. stands for standard deviation.

[1] Site C figures after Schlanger's sample (1994; n= 1,438).

Site	Flakes ≥30 mm		
	Mean flake volume[1] (mm^3)	Elongated index[2]	Massivity index[3]
A	1127.6	128.0	20.6
B	1376.3	147.8	16.8
C	947.2[4]	130.9[4]	17.3[4]
D	558.6	125.0	16.3
F	1136.9	120.5	23.5
G	1484.2	122.1	18.7
H	1133.6	117.1	23.4
K	1960.4	112.6	24.9
N	1846.3	132.6	18.1
July '90	893.4	159.4	15.5
L	680.3	132.1	15.5
M	1306.0	121.4	17.6
O	3679.0	109.2	26.7
Site N: Level X	2401.3	98.4	27.4
Section finds	2402.9	122.6	23.0

Table 5.5: Maastricht-Belvédère. A comparison of the mean flake volume, the elongated index and the massivity index of the Unit IV primary context sites and section/test pit assemblages. The calculations are based on the figures in Table 5.4.

1 Length x Width x Thickness.
2 (Length x 100)/ Width.
3 (Thickness x 100)/ Length.
4 Site C figures after Schlanger's sample (1994; n= 1,438).

Table 5.7 shows that the highest percentages of broken flakes ≥30 mm are recorded at Sites N, H and K, respectively 64.6%, 59.9% and 57.5%. The percentages at Sites G and F are about 10% lower, while only one fourth (24.4%) of the Site C sample is described as broken. The section finds results are once more in line with the Site N percentages. The table also clearly indicates that for all Belvédère assemblages, the distal flake part is most frequently missing, while the angle of percussion is mostly ≥120°. As an exception Site C can be mentioned where the angle is generally between 100° and 119°. For details on the angle of percussion one is referred to Table 5.7.

Although a plain butt dominates in nearly all Belvédère assemblages, the flakes from the 'low density' scatters (Sites N and G), together with the Site C ones, show most frequently a prepared butt. The *Index Facettage* (IF) and *Index Facettage stricte* (IFs) for flakes ≥30 mm indicate that facetted butts are very common at Site C, respectively 50.4 and 43.7. The indexes at Sites N (IF= 27.3, IFs= 21.6) and G (IF= 22.7, IFs= 13.6) are still considered high, while for the 'high density' Site H and K assemblages lower values are recorded (respectively, IF= 20, IFs= 8.9 and IF= 18.1, IFs= 4). The almost complete lack of facetted butts at Site F (IF= 12.8, IFs= 1.2) compared to the all-over presence at Site C clearly illustrates the 'absence' of major core (flake) preparation stages at the first assemblage. The Indexes for flakes ≥50 mm show generally the same distribution as for flakes ≥30 mm. Site C followed by Sites G and N show the highest indexes, while the lowest figures are again recorded at Site F (see Table 5.8 for further details). This table also shows that at the 'low density' scatters the lowest percentages of dorsal preparation near the butts is recorded (2.7% for Site G and 6.7% for Site N). The highest percentages are now recorded at Sites H (10%), K (9.6%) and F (9%). For Site C no data was available.

The data on the dorsal surface preparation shows that a 'parallel' unidirectional pattern appears most frequently in

Site	All flakes					All flakes ≥30 mm									
	Cortex		25% or more cortex		Non-cortex/ cortex ratio	Cortex		25% or more cortex		Non-cortex/ cortex ratio	Natural fissures		25% or more natural fissures		Non-natural fissure/ natural fissure ratio
	n	%	n	%		n	%	n	%		n	%	n	%	
A	31	39.2	14	17.7	1.5	20	62.5	8	25.0	0.6	10	31.3	4	12.5	2.2
B	2	33.4	2	33.4	2.0	2	33.4	2	33.4	2.0	3	50.0	2	33.4	1.0
C	509[1]	16.6[1]	?[1]	?[1]	5.0[1]	?[1]	?[1]	?[1]	?[1]	?[1]	–[1]	–[1]	–[1]	–[1]	–[1]
	325[2]	22.7[2]	144[2]	10.1[2]	3.4[2]	193[2]	41.8[2]	87[2]	18.9[2]	1.4[2]	13[2]	2.7[2]	5[2]	1.0[2]	33.8[2]
D	2	20.0	–	–	4.0	1	14.3	–	–	–	–	–	–	–	0
F	136	11.6	69	5.9	7.6	37	23.9	19	12.3	3.2	65	42.0	37	23.9	1.4
G	9	12.0	4	5.3	7.3	5	22.7	1	4.5	3.4	5	22.7	–	–	3.4
H	58	21.5	17	6.3	3.7	28	31.1	11	12.2	2.2	35	38.9	18	20.0	1.6
K	3,498	32.2	1,596	14.8	2.1	1,636	53.3	731	23.8	0.9	791	25.9	335	11.0	2.9
N	69	15.4	22	4.9	5.5	32	36.3	7	7.9	1.8	5	5.7	–	–	16.6
July '90	12	80.1	6	40.1	0.3	6	85.8	3	42.9	0.2	1	14.3	–	–	6.0
L	4	50.0	–	–	1.0	2	66.7	–	–	0.5	–	–	–	–	0
M	13	29.5	6	13.0	3.4	10	34.5	6	20.7	1.9	1	3.4	–	–	28.0
O	4	40.0	3	30.0	1.5	4	57.2	3	42.9	0.8	3	42.9	1	14.3	1.3
Site N: Level X	7	24.0	2	6.8	3.1	6	37.6	2	12.6	1.7	9	56.3	2	12.5	0.8
Section finds	30	45.4	10	15.1	1.2	23	54.8	7	16.6	0.8	9	21.4	5	11.9	3.7

Table 5.6: Maastricht-Belvédère. A comparison (technological information) of the Unit IV primary context sites and section/test pit assemblages.

[1] Site C figures after Roebroeks (1988; n= 3,067).
[2] Site C figures after Schlanger's sample (1994; n= 1,438).

Sites	All flakes ≥30 mm					
	Broken Flakes		Complete/broken ratio	Most frequently missing part	Most frequently appearing angle	Angle of the largest flakes
	n	%				
A	12	37.5	1.7	Proximal	120°-130°	110°-119°
B	2	33.3	2.0	Distal	>130°	>130°
C	–[1]	–[1]	–[1]	–[1]	–[1]	–[1]
	113[2]	24.4[2]	2.8[2]	Distal, proximal[2]	100°-109°, 110°-119°[2]	–[2]
D	3	42.9	1.3	Distal	120°-130°	–
F	76	48.9	0.9	Distal	>130°	120°-130°, >130°
G	11	49.9	0.9	Distal + proximal	>130°	110°-119°, >130°
H	54	59.9	0.5	Distal	120°-130°	110°-119°
K	1,766	57.5	0.6	Distal	>130°	>130°
N	57	64.6	0.5	Distal	120°-130°	>130°
July '90	2	28.6	2.5	Distal, distal + proximal	120°-130°	120°-130°
L	1	33.3	2.0	Lateral	110°-119°, 120°-130°, >130°	–
M	17	58.6	0.7	Distal	120°-130°	110°-119°
O	3	42.9	1.0	Distal	>130°	120°-130°
Site N: Level X	8	50.0	1.0	Distal, proximal, lateral, more than one side	>130°	110°-119°
Section finds	26	61.9	0.6	Distal	>130°	120°-130°

Table 5.7: Maastricht-Belvédère. A comparison (technological information) of the Unit IV primary context sites and section/test pit assemblages.

[1] Site C figures after Roebroeks (1988; n= 3,067).
[2] Site C figures after Schlanger's sample (1994; n= 1,438).

Sites	All flakes ≥30 mm							
	Most frequent butt	IF ≥30 mm	IFs ≥30 mm	IF ≥50 mm	IFs ≥50 mm	Dorsal preparation near butt		Most frequent dorsal preparation near butt
						n	%	
A	Plain	12.6	6.3	28.6	28.6	19	24.1	Facetted/retouched
B	Plain	33.4	16.7	40.0	20.0	4	66.6	Facetted/retouched, combination ‘crushed’ and facetted/retouched
C	–[1]	50.4[3]	43.7[3]	62.8[1]	55.3[1]	–[1]	–[1]	–[1]
	Plain[2]	14.9[2]	13.6[2]	15.2[2]	13.9[2]	–[2]	–[2]	–[2]
D	Plain	28.6	14.3	–	–	3	30.0	‘Crushed’
F	Plain	12.8	1.2	10.3	0	105	9.0	‘Crushed’
G	Plain	22.7	13.6	36.4	27.3	2	2.7	Facetted/retouched
H	Plain	20.0	8.9	23.5	8.8	27	10.0	‘Crushed’
K	Plain	18.1	4.0	21.3	5.2	1,046	9.6	Facetted/retouched
N	Plain	27.3	21.6	33.4	23.0	30	6.7	‘Crushed’
July ‘90	Plain	14.3	14.3	0	0	2	13.3	‘Crushed’
L	Plain	33.3	33.3	0	0	3	37.5	Facetted/retouched
M	Retouched/ facetted	44.7	24.1	60.0	30.0	11	25.0	Facetted/retouched
O	Plain	0	0	0	0	2	20.0	Facetted/retouched
Site N: Level X	Plain	18.8	0	33.3	0	4	13.8	‘Crushed’
Section finds	Plain	19.1	7.2	18.2	9.1	16	24.2	Facetted/retouched

Table 5.8: Maastricht-Belvédère. A comparison (preparation of the butt or near the butt) of the Unit IV primary context sites and section/test pit assemblages. IF and IFs stand for respectively *Index Facettage* and *Index Facettage stricte*.

1 Site C figures after Roebroeks (1988; n= 3,067).
2 Site C figures after Schlanger's sample (1994; n= 1,438).
3 Site C figures after Roebroeks (1988; n= 3,067). The *Index Facettage* is given for all flakes.

the different Belvédère assemblages (Table 5.9). However, the highest percentage of radial/centripetal dorsal patterns are clearly recorded at Sites N and G, respectively 13.6% and 9.1%. For the 'high density' Site F (8.4%) and K (6.4%) patches the percentages are slightly lower, while at Site C (4.1%) and especially at Site H (1.1%) the lowest figures are described. The Site N scatter, directly followed by Sites F, H and K, also shows the highest rates of convergent dorsal patterns. The percentages are respectively 9.1%, 8.4%, 6.7% and 5.3%. Here, Site G (4.5%) and again Site C (3.5%) have the lowest values. According to the butt and dorsal surface preparation it seems generally that the 'low density' assemblages are better, or more often, prepared than the 'high density' artefact distributions. Due to the fact that the highest percentages of complex dorsal patterns (radial and convergent) were described at Sites N and G, these scatters also show the highest mean number of scars. This applies to flakes ≥30 mm as well as to flakes ≥50 mm, see Table 5.9.

To end this section on débitage specific inter-assemblage variations, some differences in terms of the quantity and types of refit observations are discussed below (Table 5.10). Excavated 'high density' areas such as Sites F, C and K contained high numbers of conjoined artefacts (respectively 153, 659 and 1,828 artefacts). The numbers of refitted items at the 'low density' scatters are considerably lower, respectively 73 at Site N and 25 at Site G. The low number of 40 refits at Site H can be seen as an exception, as we are probably dealing here with only a very small excavated part of a much larger distribution. Percentage-wise, however, the 'low density' Site G and N scatters, together with Sites C and K show the highest figures (respectively 33.3%, 16.2%, 21.5% and 16.8%). Due to the large quantity of conjoined artefacts at Sites K, C and F, these patches also show the highest numbers of refitted compositions and connection lines. Moreover, these distributions are identical to the one for the number of conjoined artefacts (see Table 5.10 for details). The 'low density' assemblages are only represented by relatively small conjoined groups, while the 'high density' patches contain very large compositions (*cf.* Sites C and K). The refitted artefact group size is therefore directly related to the absence (*cf.* Sites N and G) or presence of major flint knapping activities. This also influenced the quantity of different refit types. The percentages of conjoined production sequences (*Aufeinanderpassungen*, Cziesla 1986, 1990) are generally low for the 'low density' scatters at Sites G (46.7%) and N (22.4%), where refits of broken artefacts (*Aneinanderpassungen*, Cziesla 1986, 1990) are more frequently established, respectively 53.3% and 77.6%. In the 'high density' Site K, F and H distributions, the *Aufeinanderpassungen* (respectively 77.2%, 77.1%, and 59.3%) are more dominant than the *Aneinanderpassungen* (respectively 15.5%, 22.9%, and 37%). Only at Site H, and mainly at Site K, a number of flake/tool modifications (*Anpassungen*, Cziesla 1986, 1990) was refitted.

The conjoining results at Belvédère also show some horizontal differentiations. Some of the findspots represent flaking (core reduction) sequences that largely overlap spatially (Site K), whereas others represent sequences that succeeded each other both in space and time (Site C). At yet other artefact occurrences (Sites G and N), the short flaking sequences, like core edge rejuvenations, do not overlap or succeed spatially.

As mentioned before the Site K spatial conjoining results clearly show that the flint configuration does not resemble an accumulation of a number of assemblages such as those of other sites with clear artefact concentrations (*cf.* Site C). Moreover, an accumulation of scatters without clear clusters, such as the 'low density' Sites G and N, could not possibly have resulted in a distinct concentration with large quantities of refittable material (*cf. Aufeinanderpassungen*, Cziesla 1986, 1990).

5.4.3.4 Tool specific inter-assemblage variations

It has already been said before that the overall tool percentages at Belvédère are generally rather low (see Table 5.2). This becomes even more obvious when the percentages are compared with the ones from the surface scatters and loess-covered sites in the surrounding higher landscapes (see Kolen *et al.* 1999 for details). Tools are far more important at the 'low density scatters' (10.7% at Site G and 5.6% at Site N), than at the 'high density patches' (between 0.7 and 3.7 for Sites C, F, K and H). Although only representing 1.3%, the Site K patch consists of the most important number of tools (n= 137) and archaeological data indicated that most of these implements were imported as finished items (De Loecker 1992, 1994*b*, Chapter 3). Moreover, the majority of the Site K tools (like at Site N) are well-made scrapers. The Belvédère findspots show in general only minor variations with respect to tool typology. Where tools are present, pieces with signs of use, scrapers and backed knives form the major classes, and variation is limited. Only at Site K a certain percentage of denticulates and notched pieces was recorded. More details on the tool typology can be found in Table 5.11.

The maximum dimensions of all Belvédère tools ≥30 mm are between 7 and 25 mm larger than the measurements for all flakes ≥30 mm. Moreover, Sites C, G, K and N show the largest mean maximum dimensions, respectively 73.6 mm, 73.1 mm, 73 mm and 69.1 mm. The Site H (66.7 mm) and F (52 mm) tools are represented by the smallest dimensions. For the average length the distribution remains exactly the same, while tools are now between 8 and 29 mm larger than

Sites	All flakes ≥30 mm						
	Most frequent dorsal pattern	Convergent		Radial		Mean number of scars ≥30 mm	Mean number of scars ≥50 mm
		n	%	n	%		
A	'Parallel' unidirectional	2	6.3	2	6.3	3.9	6.7
B	'Parallel' bidirectional	–	–	1	16.7	3.8	4.6
C	–[1]	–[1]	–[1]	–[1]	–[1]	–[1]	–[1]
	'Parallel' unidirectional[2]	116[2]	3.5[2]	19[2]	4.1[2]	3.4[2]	4.2[2]
D	'Parallel' + lateral unidirectional, convergent, radial	2	28.6	2	28.6	4.0	–
F	'Parallel' unidirectional	13	8.4	13	8.4	3.3	3.5
G	'Parallel' unidirectional	1	4.5	2	9.1	4.2	5.3
H	'Parallel' unidirectional	6	6.7	1	1.1	2.9	4.0
K	'Parallel' unidirectional	161	5.3	197	6.4	3.4	4.5
N	'Parallel' unidirectional	8	9.1	12	13.6	4.9	6.3
July '90	'Parallel' unidirectional	1	14.3	–	–	2.9	4.0
L	'Parallel' bidirectional, 'parallel'+ lateral unidirectional, radial	–	–	1	33.3	4.3	–
M	'Parallel' + lateral unidirectional	2	6.9	4	13.8	4.0	4.5
O	'Parallel' unidirectional	1	14.3	–	–	3.1	4.0
Site N: Level X	'Parallel' unidirectional	1	6.3	1	6.3	3.2	4.0
Section finds	'Parallel' unidirectional	4	9.5	3	7.1	3.4	3.8

Table 5.9: Maastricht-Belvédère. A comparison (dorsal preparation and number of scars) of the Unit IV primary context sites and section/test pit assemblages.

[1] Site C figures after Roebroeks (1988; n= 3,067).
[2] Site C figures after Schlanger's sample (1994; n= 1,438).

Site	Number of refitted artefacts		Number of compositions	Number of connection lines	*Aufeinanderpassung* (production sequences)		*Aneinanderpassung* (breaks)		*Anpassung* (modifications)		*Einpassung* (inserts like heat damage)	
	n	%			n	%[1]	n	%[1]	n	%[1]	n	%[1]
A	20	25.0	9	11	9	81.8	2	18.1	–	–	–	–
B	2	33.3	1	1	1	100.0	–	–	–	–	–	–
C	659[2]	21.5[2]	?[3]	?[3]	?[3]	?[3]	?[3]	?[3]	?[3]	?[3]	–	–
D	5	45.5	2	3	1	100.0	–	–	–	–	–	–
F	153	13.0	45	105	81	77.1	24	22.9	–	–	–	–
G	25	33.3	10	15	7	46.7	8	53.3	–	–	–	–
H	40	14.8	14	27	16	59.3	10	37.0	1	3.7	–	–
K	1,828	16.8	321	1,582	1,221	77.2	245	15.5	55	3.5	61	3.9
N	73	16.2	25	49	11	22.4	38	77.6	–	–	–	–
July '90	4	26.7	2	2	2	100.0	–	–	–	–	–	–
L	–	–	–	–	–	–	–	–	–	–	–	–
M	–	–	–	–	–	–	–	–	–	–	–	–
O	–	–	–	–	–	–	–	–	–	–	–	–
Site N: Level X	–	–	–	–	–	–	–	–	–	–	–	–
Section finds	–	–	–	–	–	–	–	–	–	–	–	–

Table 5.10: Maastricht-Belvédère. A comparison or the refitted data of the Unit IV primary context sites and section/test pit assemblages.

[1] The percentages are calculated from the total number of refits.
[2] Site C figures after Roebroeks (1988; n= 3,067).
[3] No data available due to the fact that the assemblage was refitted in a pre-Cziesla period (*cf.* Cziesla 1986, 1990).

Bordes 1961		Site A		Site C		Site F		Site G		Site H		Site K		Site N		July '90		Site M		Section finds		Total	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
6	Mousterian points	–	–	–	–	–	–	–	–	–	–	4	2.9	1	3.8	–	–	–	–	–	–	5	2.3
9	Single straight side scrapers	–	–	–	–	–	–	–	–	–	–	20	14.6	–	–	–	–	–	–	–	–	20	9.0
10	Single convex side scrapers	–	–	2	8.7	–	–	–	–	2	20.0	17	12.4	6	23.1	1	100.0	–	–	1	25.0	29	13.1
12	Double straight side scrapers	–	–	–	–	–	–	–	–	–	–	1	0.7	–	–	–	–	–	–	–	–	1	0.5
13	Double straight-convex side scrapers	–	–	–	–	–	–	–	–	–	–	4	2.9	1	3.8	–	–	–	–	–	–	5	2.3
15	Double convex side scrapers	–	–	1	4.3	–	–	1	12.5	–	–	8	5.9	1	3.8	–	–	–	–	–	–	11	5.0
17	Double concave-convex side scrapers	–	–	–	–	–	–	–	–	–	–	–	–	1	3.8	–	–	–	–	–	–	1	0.5
18	Convergent straight side scrapers	–	–	–	–	–	–	–	–	–	–	3	2.2	–	–	–	–	–	–	–	–	3	1.4
19	Convergent convex side scrapers	–	–	–	–	–	–	–	–	–	–	1	0.7	–	–	–	–	–	–	–	–	1	0.5
21	Déjeté (offset) scrapers	–	–	–	–	–	–	–	–	1	10.0	15	11.0	–	–	–	–	–	–	1	25.0	17	7.7
22	Straight-transvese side scrapers	–	–	–	–	1	12.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	0.5
23	Convexe transverse side scrapers	–	–	–	–	–	–	–	–	–	–	3	2.2	–	–	–	–	–	–	–	–	3	1.4
25	Side scrapers with inverse retouche	–	–	–	–	–	–	–	–	–	–	5	3.6	–	–	–	–	–	–	–	–	5	2.3
29	Alternate retouched side scrapers	–	–	–	–	–	–	–	–	–	–	2	1.5	–	–	–	–	–	–	–	–	2	0.9
32	Typical burins	–	–	–	–	–	–	–	–	–	–	1	0.7	–	–	–	–	–	–	–	–	1	0.5
34	Typical borers	–	–	–	–	1	12.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	0.5
36	Typical backed knives	–	–	1	4.3	–	–	1	12.5	–	–	1	0.7	–	–	–	–	–	–	–	–	3	1.4
37	Atypical backed knives	–	–	1	4.3	–	–	1	12.5	–	–	1	0.7	3	11.5	–	–	–	–	–	–	6	2.7
38	Naturally backed knives	1	50.0	1	4.3	2	25.0	–	–	–	–	5	3.6	1	3.8	–	–	–	–	1	25.0	11	5.0
42	Notched pieces	–	–	–	–	–	–	–	–	–	–	5	3.6	–	–	–	–	1	33.3	–	–	6	2.7
43	Denticulates	–	–	–	–	–	–	–	–	–	–	6	4.4	1	3.8	–	–	1	33.3	–	–	8	3.6
45	Pieces retouched on the ventral surface	–	–	–	–	–	–	–	–	–	–	1	0.7	–	–	–	–	–	–	–	–	1	0.5
98	Pieces with signs of use	–	–	12	52.2	3	37.5	3	37.5	5	50.0	17	12.4	8	30.8	–	–	1	33.3	–	–	49	22.1
99	Retouched pieces	1	50.0	–	–	1	12.5	–	–	–	–	12	8.8	–	–	–	–	–	–	1	25.0	15	6.8
	Refitted tool fragments	–	–	2	8.7	–	–	2	25.0	2	20.0	5	3.6	3	11.5	–	–	–	–	–	–	14	6.3
	Tools unavailable for description	–	–	3	13.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	1.4
Total		2	100.0	23	99.8	8	100.0	8	100.0	10	100.0	137	99.8	26	99.7	1	100.0	3	99.9	4	100.0	222	100.9

Table 5.11: Maastricht Belvédère. A tool comparison (basic count) of the Unit IV primary context sites and section/test pit assemblages. For Sites B, D, L, O and N (Level X) no tools were described.

all flakes ≥30 mm. According to the average length of all complete tools, the ‘low density’ Site G scatters (93 mm), together with Site C (76.6 mm), show the largest dimensions. Here tools are between ca. 35 mm larger than the flakes. The complete Site N and Site H tools show the smallest mean values (respectively 69 mm and 70.3 mm). This is probably due to the fact that a large percentage of these tools is broken (see Table 5.15). However, they are still between 13 and 25 mm larger than the flakes. The Site K (50.6 mm), G (46.3 mm) and N (44.1 mm) assemblages consist also of the widest tools, while the smallest width is recorded at Site F (35.5 mm). Sites K (13.1 mm) and G (12.3 mm) furthermore show the thickest mean tool measurements, while the thinnest means were recorded for Site F (10 mm) and Site C (8.9 mm). For details on the mean tool measurements the reader is referred to Table 5.12. Generally it can be concluded that the ‘low density’ Site G and N scatters, together with the ‘high density’ Site C and K patches, show the largest mean tool measurements. The Site C tools are among the items with the smallest width and thickness. As these four assemblages consist of the highest quantities of tools and/or transported lithics (flakes and cores), it can be said that when blanks or tools were selected, produced, transported and/or used, the emphasis was clearly on items with large and wide dimensions, or better on items with large cutting edges (see later).

The mean volumes and elongated indexes for tools ≥30 mm at all Belvédère assemblages are much larger/higher than for all flakes ≥30 mm, whereas the massivity indexes are always smaller (Table 5.13). Like for flakes ≥30 mm the most voluminous tools were recovered at Site K and in the ‘low density’ Site G and N find distributions (respectively, 4454.4 mm^3, 3980.7 mm^3 and 3043.2 mm^3). The smallest mean tool volume was calculated for Site F (1679.2 mm^3). Also the elongated index distribution for tools shows similarities with the one for all flakes. Here, Site C (174.4), together with Sites G (151), N (147.6) and H (146.8), have the highest values. Sites F and K are represented by the lowest indexes (respectively, 133.2 and 132.8). The massivity index gives again a very different picture. The ‘high density’ Site F and K assemblages represent the highest values (respectively 21.1 and 19.5), while the figures for Sites G (17.6), H (17.2) and N (16.3) are somewhat lower. Like for all flakes ≥30 mm the Site C massivity index is one of the lowest at Belvédère (12.7).

The tools recovered from the ‘high density’ patches show generally the highest amounts of cortex. The percentages range from 30.4% at Site C and 40.9% at Site K to 50% at Site F. The ‘low density’ Site N (23%) and G (12.5%) figures are amongst the lowest in the sample. For the distribution of tools with 25% cortex or more one is referred to Table 5.14. Although most of the Belvédère tools were probably part of transported ‘toolkits’, refitting indicates that a limited number was selected or produced at the ‘high density’ findspots as well. This could explain the higher cortex percentages on the Site F, K and C tools. A comparable explanation can be given for the high percentage (71.4%) of natural fissures at Site F. A much lower percentage of flaws was recorded at Sites G, K, N and C (respectively 25%, 14.8%, 8.7% and 4.3%), while only the ‘high density’ Site F and K patches consist of tools with more than 25% natural fissures (Table 5.14). The fact that the lowest percentages of natural fissures were described at the assemblages where the highest number of imported tools was found (Sites K, N, C and G) could indicate that mainly blanks/tools on ‘better quality’ raw materials (less effected by flaws) were selected for transport and/or use.

The highest percentages of broken tools are recorded at Sites F, N and H, respectively 71.4%, 69.1% and 66.6% (Table 5.15). Although most of the broken tools were recovered from the Site K patch, they represent one of the lowest percentages at Belvédère (40.4%). Only at Site C (21.6%) a lower figure was described. As for all flakes the distal tool part is most frequently missing, while the angle of percussion is mainly ≥120°. Only at Site H is the proximal part most frequently missing and the angle is here mainly between 100° and 119°. See Table 5.15 for details.

At Sites C and N most of the tools display facetted or retouched butts. A punctiform and polyhedral butt appear often at Sites G and H, while a plain butt dominates the Site F and K tool assemblages. According to the different indexes in Table 5.16 the Site C tools, together with the ‘low density’ Site G and N ones, show most frequently a prepared butt. The *Index Facettage* (IF) and *Index Facettage stricte* (IFs) at these tool assemblages are respectively (IF=) 47.8, 28.6, 30.4 and (IFs=) 30.4, 28.6, 21.7. The indexes at the ‘high density’ Sites F (IF and IFs each 14.3), H (IF= 22.2, IFs= 11.1), and especially K (IF= 18.5, IFs= 4.2) are considerably as lower. For tools ≥50 mm the indexes generally show the same distribution. Site C, followed by Sites N and G always show the highest indexes, while the lowest figures are recorded at Sites K and F.

Most of the tool assemblages are dominated by blanks with a ‘parallel’ unidirectional dorsal pattern (Table 5.17). At Site N, however, a ‘parallel’ + lateral unidirectional pattern appears most frequently. This is only logical as this ‘low density’ assemblage consists of a relatively high number of imported ‘core trimming flakes’, struck from the side of the core’s working surface. The sharp edges on one margin of these blanks often show macroscopic traces of utilization, indicating that they were used as cutting equipment. Some of the items were described as typical *éclats débordants*

Site	Mean measurements of tools ≥30 mm									
	Maximum dimension		Length		Length complete tools		Width		Thickness	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
A	–	–	–	–	–	–	–	–	–	–
B	–	–	–	–	–	–	–	–	–	–
C	73.6[1]	18.1[1]	70.1[1]	18.6[1]	76.6[1]	18.3[1]	40.2[1]	11.9[1]	8.9[1]	3.0[1]
D	–	–	–	–	–	–	–	–	–	–
F	52.0	15.4	47.3	15.3	–	–	35.5	11.4	10.0	4.8
G	73.1	43.7	69.9	44.6	93.0	65.0	46.3	11.8	12.3	6.1
H	66.7	13.7	62.1	13.9	70.3	14.0	42.3	6.8	10.7	4.2
K	73.0	23.0	67.2	26.1	71.4	25.0	50.6	15.8	13.1	6.5
N	69.1	26.9	65.1	28.3	69.0	21.2	44.1	12.4	10.6	4.8
July '90	–	–	–	–	–	–	–	–	–	–
L	–	–	–	–	–	–	–	–	–	–
M	–	–	–	–	–	–	–	–	–	–
O	–	–	–	–	–	–	–	–	–	–
Site N: Level X	–	–	–	–	–	–	–	–	–	–
Section finds	–	–	–	–	–	–	–	–	–	–

Table 5.12: Maastricht-Belvédère. A comparison of the average measurements on tools of the Unit IV primary context sites and section/test pit assemblages. S.D. stands for standard deviation.

[1] Based on 18 tools.

Site	Tools ≥30 mm		
	Mean tool volume[1] (mm^3)	Elongated index[2]	Massivity index[3]
A	–	–	–
B	–	–	–
C	2508.0[4]	174.4[4]	12.7[4]
D	–	–	–
F	1679.2	133.2	21.1
G	3980.7	151.0	17.6
H	2810.7	146.8	17.2
K	4454.4	132.8	19.5
N	3043.2	147.6	16.3
July '90	–	–	–
L	–	–	–
M	–	–	–
O	–	–	–
Site N: Level X	–	–	–
Section finds	–	–	–

Table 5.13: Maastricht-Belvédère. A comparison of the mean tool volume, the elongated index and the massivity index of the Unit IV primary context sites and section/test pit assemblages. The calculations are based on the figures in Table 5.12.

[1] Length x Width x Thickness.
[2] (Length x 100)/ Width.
[3] (Thickness x 100)/ Length.
[4] Site C figures based on 18 tools.

(Beyries and Boëda 1983, *cf.* Site G), while others are comparable in form, *i.e.* triangular in cross-section and with a clear back, resembling 'backed knives' (Roebroeks *et al.* 1992). The dominance of a radial/centripetal dorsal pattern on the Site C tools (43.5%) can be explained by the fact that these were produced from transported cores; the assemblage is mainly the result of a prepared core technique, including several 'classic' Levallois flakes and products of a *débitage Levallois recurrent* (Boëda 1986, 1993, 1994). Table 5.17 also shows that the highest number of radial patterns was recorded at Site K (n= 17). They represent, however, only 14.3 %, which is within the range of most other tool assemblages. Site K also shows the highest number of convergent patterns (n= 19 or 16%). Together with Site F (28%) they represent the highest percentages at Belvédère. For the Site N (8.7%) and C (4.3%) tools the lowest percentages were recorded. According to the dorsal surface preparation, and especially the butts, it seems (as for all flakes) that the tools of the 'low density' assemblages, as well as the Site C ones, are better, or more often, prepared than the others. Probably this is the main reason for the high mean number of scars described at Sites N, G and C. This applies to tools ≥30 mm as well as to tools ≥50 mm. See Table 5.17 for more details.

Most frequently a convex tool edge was described at Belvédère. Only at Sites K and G other edge forms dominate the tool assemblages, respectively straight and wavy. In most cases the working edges are located on the left and/or right dorsal side of the tools. The pattern of retouch is most frequently continuous. The largest mean working edge lengths were described at Sites H (73.9 mm) and G (72 mm), while the smallest measurements were recorded at Site C (42.7 mm) and especially at Site F (25.1 mm). For the mean

Site	All tools									
	Cortex		25% or more cortex		Non-cortex/cortex ratio	Natural fissures		25% or more natural fissures		Non-natural fissure/natural fissure ratio
	n	%	n	%		n	%	n	%	
A	–	–	–	–	–	–	–	–	–	–
B	–	–	–	–	–	–	–	–	–	–
C	7[1]	30.4[1]	3[1]	13.0[1]	1.6[1]	1[1]	4.3[1]	–[1]	–[1]	17.0[1]
D	–	–	–	–	–	–	–	–	–	–
F	4	50.0	1	25.0	1.0	5	71.4	1	14.3	0.4
G	1	12.5	–	–	7.0	2	25.0	–	–	3.0
H	2	20.0	–	–	4.0	–	–	–	–	–
K	56	40.9	20	14.6	1.4	20	14.7	7	5.2	5.9
N	6	23.0	1	3.8	3.3	2	8.7	–	–	10.5
July ‘90	–	–	–	–	–	–	–	–	–	–
L	–	–	–	–	–	–	–	–	–	–
M	–	–	–	–	–	–	–	–	–	–
O	–	–	–	–	–	–	–	–	–	–
Site N: Level X	–	–	–	–	–	–	–	–	–	–
Section finds	–	–	–	–	–	–	–	–	–	–

Table 5.14: Maastricht-Belvédère. A comparison of the tools (technological information) of the Unit IV primary context sites and section/test pit assemblages.

[1] Based on 18 tools.

Sites	All tools ≥30 mm				
	Broken tools		Complete/broken ratio	Most frequently missing part	Most frequently appearing angle
	n	%			
A	–	–	–	–	–
B	–	–	–	–	–
C	5[1]	21.6[1]	2.6[1]	Distal[1]	110°-119°, 120°-130°[1]
D	–	– 71.4	–	–	–
F	5	57.2	0.4	Distal	>130°
G	4	66.6	0.8	Distal	120°-130°
H	6	40.4	0.5	Proximal	110°-119°
K	48	69.6	1.4	Distal	120°-130°, >130°
N	16		0.4	Distal	120°-130°
		–			
July '90	–	–	–	–	–
L	–	–	–	–	–
M	–	–	–	–	–
O	–	–	–	–	–
Site N: Level X	–		–	–	–
		–			
Section finds	–		–	–	–

Table 5.15: Maastricht-Belvédère. A comparison of the tools (technological information) of the Unit IV primary context sites and section/test pit assemblages.

[1] Based on 18 tools.

width the largest measurements were recorded at Sites K (3.3 mm) and N (3.1 mm), while Site F (2.5 mm) and Site C (1.6 mm) again show the smallest dimensions. Macroscopic signs of use and 'fish scale' are the most frequently appearing retouches in all Belvédère tools assemblages. For further details the reader is referred to Table 5.18 and 5.19.

To end the section on tool specific inter-assemblage variations, the scrapers of Sites K and N are compared. At these findspots the highest number of scrapers was recovered. They in fact dominate the tool assemblages in question, with respectively n= 83 or 66.6% and n= 10 or 38.3%. The mean scraper measurements, given in Table 5.20-A, are almost identical. This applies as well to the mean scraper volume, the elongated index and the massivity index (Table 5.20-B). Although the Site N scrapers are on average slightly larger and wider than the Site K ones, the only clear difference is given by the butt preparation. The *Index Facettage* (IF) and *Index Facettage stricte* (IFs) show that at Site N (IF= 54.6, IFs= 26.4) the scrapers are better, or more often, prepared than at Site K (IF= 21.4, IFs= 3.6). The mean length of the working edges is again remarkably identical, while the working edges at Site N are somewhat wider.

As discussed before, nearly all scrapers at Belvédère were introduced at the findspots as finished items. According to the blank measurements a number of rather identical flakes was produced and/or selected to be retouched into scrapers with similar mean working edge measurements. Although some of the blanks (*cf.* Site N) were better prepared than others, it can be suggested that the scraper-part of the transported Saalian 'toolkits' was very standardized.

5.4.3.5 Conclusion

In general a total of 16,221 flint artefacts was recovered from the Saalian Unit IV level at Maastricht-Belvédère (together ca. 1,577 m^2 of 'excavated' surface). This comes to 10.3 artefacts per metre square. Furthermore only 222 tools were recorded (1.4% of all Saalian artefacts), giving an average

Sites	All tools ≥30 mm							
	Most frequent butt	IF ≥30 mm	IFs ≥30 mm	IF ≥50 mm	IFs ≥50 mm	Dorsal preparation near butt		Most frequent dorsal preparation near butt
						n	%	
A	–	–	–	–	–	–	–	–
B	–	–	–	–	–	–	–	–
C	Facetted[1]	47.8[1]	30.4[1]	52.4[1]	33.3[1]	–[1]	–[1]	–[1]
D	–	–	–	–	–	–	–	–
F	Plain	14.3	14.3	0	0	1	12.5	–
G	Punctiform	28.6	28.6	28.6	28.6	–	–	–
H	Polyhedral	22.2	11.1	25.0	12.5	–	–	–
K	Plain	18.5	4.2	19.0	5.0	61	44.5	Facetted/retouched
N	Retouched	30.4	21.7	33.4	22.3	–	–	–
July '90	–	–	–	–	–	–	–	–
L	–	–	–	–	–	–	–	–
M	–	–	–	–	–	–	–	–
O	–	–	–	–	–	–	–	–
Site N: Level X	–	–	–	–	–	–	–	–
Section finds	–	–	–	–	–	–	–	–

Table 5.16: Maastricht-Belvédère. A comparison of the tools (preparation of the butt or near the butt) of the Unit IV primary context sites and section/test pit assemblages. IF and IFs stand for respectively *Index Facettage* and *Index Facettage stricte*.

[1] Based on 18 tools.

Sites	All tools ≥30 mm						
	Most frequent dorsal pattern	Convergent		Radial		Mean number of scars ≥30 mm	Mean number of scars ≥50 mm
		n	%	n	%		
A	–	–	–	–	–	–	–
B	–	–	–	–	–	–	–
C	Radial[1]	1[1]	4.3[1]	10[1]	43.5[1]	6.1[1]	6.2[1]
D	–	–	–	–	–	–	–
F	'Parallel' unidirectional	2	28.6	1	14.3	4.2	5.5
G	'Parallel' unidirectional	1	14.3	1	14.3	6.1	6.1
H	'Parallel' unidirectional	1	11.1	1	11.1	4.4	4.6
K	'Parallel' unidirectional	19	16.0	17	14.3	5.1	5.5
N	'parallel' + lateral unidirectional	2	8.7	3	13.0	6.2	6.7
July '90	–	–	–	–	–	–	–
L	–	–	–	–	–	–	–
M	–	–	–	–	–	–	–
O	–	–	–	–	–	–	–
Site N: Level X	–	–	–	–	–	–	–
Section finds	–	–	–	–	–	–	–

Table 5.17: Maastricht-Belvédère. A comparison of the tools (dorsal preparation and number of scars) of the Unit IV primary context sites and section/test pit assemblages.

[1] Based on 18 tools.

Sites	All tools			
	Most frequent edge form	Most frequent location of the working edge	Most frequent location of the retouch	Most frequent pattern of the retouch
A	–	–	–	–
B	–	–	–	–
C	Convex	Left and right	Dorsal	Continuous
D	–	–	–	–
F	Convex	Left	Dorsal	Continuous
G	Wavy	Left and right	Dorsal	Continuous
H	Convex	Right	Dorsal	Continuous
K	Straight	Left	Dorsal	Continuous
N	Convex	Left	Dorsal	Continuous
July ‘90	–	–	–	–
L	–	–	–	–
M	–	–	–	–
O	–	–	–	–
Site N: Level X	–	–	–	–
Section finds	–	–	–	–

Table 5.18: Maastricht-Belvédère. A comparison of the tools of the Unit IV primary context sites and section/test pit assemblages.

Site	All tools					
	Length working edge		Width working edge		Most frequent type of retouch	The second most frequent type of retouch
	Mean	S.D.	Mean	S.D.		
A	–	–	–	–	–	–
B	–	–	–	–	–	–
C	42.7	23.9	1.6	1.2	Macroscopic signs of use	‘Fish scale’ retouch
D	–	–	–	–	–	–
F	25.1	19.9	2.5	1.7	Macroscopic signs of use	‘Fish scale’ retouch
G	72.0	59.8	2.7	1.0	Macroscopic signs of use	‘Fish scale’ retouch
H	73.9	66.9	2.8	2.5	Macroscopic signs of use	‘Fish scale’ retouch
K	63.5	56.5	3.3	2.0	‘Fish scale’ retouch	Macroscopic signs of use
N	52.3	36.7	3.1	2.6	Macroscopic signs of use	‘Fish scale’ retouch
July ‘90	–	–	–	–	–	–
L	–	–	–	–	–	–
M	–	–	–	–	–	–
O	–	–	–	–	–	–
Site N: Level X	–	–	–	–	–	–
Section finds	–	–	–	–	–	–

Table 5.19: Maastricht-Belvédère. A comparison of the average measurements and type of retouch on tools of the Unit IV primary context sites and section/test pit assemblages. S.D. stands for standard deviation.

A

Site	Mean measurements of scrapers ≥30 mm													
	Maximum dimension		Length		Width		Thickness		Butt		Length working edge		Width working edge	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	IF ≥30 mm	IFs ≥30 mm	Mean	S.D.	Mean	S.D.
K	72.0	24.6	67.0	26.5	49.2	15.7	12.0	6.0	21.7	3.6	74.5	58.5	3.5	1.7
N	74.3	26.1	69.1	28.0	48.4	11.6	11.9	4.3	54.6	36.4	75.0	43.1	5.2	2.6

B

Site	Scrapers ≥30 mm		
	Mean Tool volume[1] (mm^3)	Elongated index[2]	Massivity index[3]
K	3955.7	136.2	17.9
N	3979.8	142.8	17.2

Table 5.20: Maastricht-Belvédère. A: A comparison of the average measurements and butts on scrapers of the Unit IV primary context sites and section/test pit assemblages. S.D. stands for standard deviation. IF and IFs stand for respectively *Index Facettage* and *Index Facettage stricte*. B: A comparison of the mean scraper volume, the elongated index and the massivity index of the Unit IV primary context sites and section/test pit assemblages. The calculations are based on the figures in Table 5.20-A.

[1] Length x Width x Thickness.
[2] (Length x 100)/ Width.
[3] (Thickness x 100)/ Length.

of 0.1 per metre square. The latter consist of 145 tools *sensu stricto* and 77 pieces with macroscopic signs of use, respectively 0.9% and 0.5% of all finds. Cores are only represented by 101 pieces (0.6 of all artefacts) and give a mean distribution of 0.06 per metre square. In total 2,809 (or 17.3%) of all Unit IV artefacts could be conjoined. The executed lithic and refitting analysis shows that the described inter-site variations are indicative of a relative 'rich' interpretation potential.

According to some variations in artefact density, composition and conjoining potentials it is, generally, possible to distinguish two different kinds of find distributions at Belvédère. On the one hand there are the 'patchy' occurrences or the so-called 'high density' find distributions like Sites C, F, H and K. These findspots, representing the 'classic' sites or level three in Isaac's classification (Isaac 1981; see also Section 5.1), are characterized by dense clustered appearances of large quantities of artefacts. The patches show a striking dominance of flint knapping debris and turned out to be 'a refitter's paradise' (De Loecker *et al*. 2003). Some were so well preserved that through a detailed refitting study, for example at Sites C, F (Roebroeks 1988) and K (De Loecker 1992, 1994*a* and *b*), inferences on former reductions schemes could be produced (Schlanger 1994, 1996, see also Chapters 3 and 4). On the other end of the density scale there are a number of very 'low density off-site' distributions, like Sites G and N. These scatters predominantly consist of isolated and/or small groups of flakes, tools and relatively few dorsal/ventral refits. They represent Isaac's (1981) levels one and two (Isaac 1981; see also Section 5.1). For a brief generalization of the 'high and low density' find distributions, focusing on the described technological and morphological inter-site differences, the reader is referred to Section 5.5. However, tools are far more important in the 'low density' Site G and N scatters, than in the 'high density' Site C, F, K and H patches. Pieces with signs of use, scrapers and backed knives dominate the Belvédère tool assemblages. Generally the Unit IV tools are larger and more voluminous, but less massive, than the flake assemblages. Especially at the 'low density' scatters, together with Sites C and K, the largest mean tool measurements were recorded. These tool assemblages also show the lowest percentages of natural fissures, while the dorsal surfaces, and especially the butts, are more frequently, or better, prepared (*cf.* Sites G, N and C). The tool assemblages consist of the highest quantities of transported items. It can, therefore, be concluded that when tools/blanks were selected for transportation and/or used, the emphasis was clearly on well-prepared items with large and wide dimensions (large cutting edges) and produced on better quality (and finer-grained flint) raw materials. Moreover, it seems that part of the transported 'toolkits' was very standardized as is shown by the Site K and N scrapers.

5.5 'Scatters and patches': a model for inter-assemblage variability

5.5.1 Introduction

The Maastricht-Belvédère Unit IV excavations recorded an 'all over' presence of discarded lithic material within a small segment of the old Middle Pleistocene (Saale inter-glacial) river Meuse valley. Section 5.4.3 convincingly demonstrated that the continuous artefact distribution or 'veil of stones' (Roebroeks *et al*. 1992) has yielded assemblages that show striking differences when compared with one another. In defining these, sometimes, fine-grained, inter-site (and intra-site) differences, refitting combined with a detailed lithic characterization of the assemblages proved to be essential. The fact that a number of 'high density' patches are presented against an all-over background of 'low density' scatters could be related to differences in land-use by the Middle Pleistocene early humans (*cf.* Binford 1987*a*). Moreover, the site variations provide some arguments for understanding the palaeo-record at Maastricht-Belvédère. After a brief generalized 'definition'/characterization, based on Section 5.4, of the 'high and low density' find distributions, the differences will be discussed in terms of early human behaviour. Transport of lithics will play a crucial role in the interpretation of the local Saalian record.

5.5.2 The 'high density' find distributions or patches: Sites K, F H and C

As mentioned before the Belvédère excavations uncovered a number of 'high density' flint distributions, which show a striking dominance of flint knapping debris (Site C, F, H and K). The spatial find configurations consist of a 'single' and large artefact cluster, which is completely lacking at the 'low density scatters'. These 'patchy' find occurrences mainly consist of enormous quantities of flint debitage, *i.e.* small chips/spalls and non-retouched (decortication) flakes. The number of dorsal/ventral conjoinings is high. Generally, the 'high density' patches are found in association with few tools and cores. Site K can be seen as an exception, as relatively 'high' numbers of tools and cores were recorded here. It is suggested that most of these tools (60.6% are scrapers on 'exotic' flint) arrived at the findspot as well-prepared (sometimes produced on Levallois blanks) finished products of a 'transported toolkit'. The 'few' Site F and H tools, on the other hand, were probably for the greater part produced on the spot. The 'high' number of Site K cores represents another exception at Belvédère. It seems that all were produced on the spot. The fact that (limited-prepared) cores were discarded in large quantities suggests that they were probably intended for local use only.

The analysis of the Site F, H and K patches, furthermore, shows that most stages/phases of the reduction strategy are represented in the excavated areas. The operational schemes show that 'locally' collected and non-prepared (non-tested) raw material nodules were introduced to the excavated surfaces, to be decorticated and split (*i.e.* by removal of large flakes and flaws) on the spot. Subsequently, the individual parts, or cores, were used for the production of flakes. Few of the larger blanks were selected and transformed into, or used as, tools. The remnants of all these reduction stages were discarded on the spot, a statement that is confirmed by the high number of dorsal/ventral conjoinings.

In general the mentioned assemblages are mainly the result of a disc/discoidal reduction strategy ('unifacial' disc[oidal] and interchanging bifacial discoidal, *cf*. Boëda 1993) with limited attention for core preparation. The dominance of 'waste' from all core reduction stages, the large numbers of cores at Site K, and especially the detailed refitting analysis imply that flint knapping was a main activity at the Site F, H and K locations. Logically, this activity was responsible for the 'patchy' nature of the distribution. It can therefore be concluded that this type of 'high density patch' is characterized by the 'local' (expedient) character/maintenance of technology.

According to refitting, the reduction sequences overlap spatially. At Site K it even seems that the internal structuring in the use of space was 'preserved' and the excavated material may therefore represent one continuous and consistent occupation of the area. The homogeneity of the Site K raw materials, technology, typology, the many interlocus conjoinings and the 'uniformity' of the spatial layout, all point to a 'single' occupation phase and not to a palimpsest of several unrelated events. As a result this findspot can be seen as a more organized entity.

A completely different kind of 'high density' find distribution was excavated at Site C (Roebroeks 1988; Roebroeks and Hennekens 1990). Although this assemblage can be described as a 'patch', it contrasts clearly with Sites K, F and H. Instead of one big artefact concentration we are dealing here with 'smaller' clusters which were situated close to each other. The find occurrence mainly consists of flint debitage together with very few tools *sensu stricto* (all of them scrapers and backed knives) and some flakes with macroscopic signs of use. Again a large number of dorsal/ventral conjoinings were established.

The Site C technological characterization shows in general a different core reduction strategy than Sites K, F and H. The assemblage is to a large extent the result of a well-prepared core approach, with several 'classic' Levallois flakes and the products of a *débitage Levallois recurrent* (*cf*. Boëda 1986, 1993, 1994). Besides this Levallois reduction strategy, it seems that a smaller part of the assemblage also involved a disc/discoidal core approach (Boëda 1993). The latter products are produced on a more 'coarse' grained flint type than the rest of the raw materials.

Refitting showed that several different flint nodules/cores (and tools and flakes) entered and left the excavated Site C area in various stages of reduction (Roebroeks 1988). Moreover, the excavated Raw Material Units represent distinct spatial patterns. In this way the Site C 'patch' differs completely from the ones at Sites K, F and H. On the one hand a number of (prepared) cores was introduced at the Site C location to be further reduced and subsequently transported away. On the other hand most of the Site K, F (and H) reduction sequences must have started and ended within the excavated area. The degree of import at the latter findspots can be considered as low.

The Site C spatial layout does not provide evidence for an 'organized' use of space (Roebroeks 1988), all the various scatters can be seen as isolated flint knapping events spread in time. Whether or not these clusters belong to one continuous episode of use remains an open question. However, according to refitting, the lack of spatial repetition (*cf*. Site K) may indicate that Site C is a palimpsest of different activities spread in time.

Generally, it can be concluded that flint knapping was one of the main activities carried out at the Site C location, as the majority of the (refitted) lithic assemblage consist of debitage and some cores. In contrast to Sites K, F and H, the Site C technology was clearly orientated towards the production or maintenance of prepared flakes and cores, to be transported to other locations. In other words, refitting shows that the excavated area mainly reflects a 'coming and going' of well-prepared cores and flakes which were worked or produced at other locations. Moreover, the manufacturing techniques seem to reflect a much more economical behaviour than the Site K, H and F 'high density' distributions.

5.5.3 The 'low density' find distributions or scatters: Sites G and N

It is clear that the dense patches of artefacts have a high archaeological visibility and that they represent the most frequent excavated surfaces (the 'classic' site) in the Palaeolithic record. However, between the large clusters of artefacts, like Sites C, F, H and K, stray finds have been recorded all over the pit (amongst others the section finds). Here, flint artefacts appear to have been discarded as isolated objects, or in a small group of one to a few dozen. Especially during the last years of Belvédère research, the emphasis was on the excavation of so-called 'low density' patterns, in order to record the nature of the archaeology 'surrounding' the 'high density' patches. This shift of interest highlighted the importance of the 'off-site' scatters for the interpretation of the Belvédère locality (Roebroeks *et al*. 1992).

Generally, it seems that, at least at Maastricht-Belvédère, large parts of the distribution patterns in the intra-Saalian interglacial river valley bottom were characterized by low densities of artefacts and faunal remains. Compared to the 'high density' patches, these 'low density' scatters show distinct differences in the spatial patterning of the finds, typology, technology and raw material composition (see Section 5.4.3).

Segments of this suggested 'continuous low density' distribution were excavated at Sites G (Roebroeks 1988) and N (Roebroeks *et al.* 1992). At both scatters a rather small number of artefacts was recovered in association with faunal remains. The artefacts were more or less evenly distributed among sparse bone fragments and no clear artefact concentrations could be described. The mean artefacts density can be considerate as (extremely) low. Conspicuously, and in contrast with the patches, the highest percentages of tools were recorded at these scatters. They were recovered as isolated and 'worn out'. The most commonly appearing tool types are heavily reduced and sometimes broken scrapers (mainly at Site N), many large flakes with macroscopic signs of use and (unretouched) backed knives. These implements are considered to represent well-prepared parts of imported 'toolkits'.

Although the excavations recorded some small debitage areas, refitting generally indicates a lack of evidence for substantial primary flint-working activities and tool production. Only some very fine knapping debris could be conjoined to a few larger flakes. These scarce dorsal/ventral refits occasionally represent small parts of reduction/retouching sequences. However, more than half of the Site G and N conjoinings consist of broken artefacts. The fact that decortication flakes are scarce and only one (exhausted and prepared) disc core was excavated at Site N also supports a lack of major flint knapping activities inside the excavated 'low density' areas. Moreover, the flakes from the scatters have generally the largest measurements, they are rather voluminous, they have the highest mean number of scars and they show low cortex and natural fissure percentages. Their butts and dorsal surfaces are better or more often prepared. The Facetting Indexes are among the highest at Belvédère. The used raw materials show a large heterogeneity, which is also clear from the rather negative refitting results: *i.e. Aufeinanderpassungen*.

All this could indicate that the 'low density' scatters were not formed in one continuous sequence of (related) activities. Instead it seems more likely that we are dealing here with palimpsests of many small scatters and/or isolated artefacts which were formed separately in space and time.

In conclusion, Section 5.4.3 clearly showed that the technological and typological characteristics of the tool dominated Site N assemblage, as well as the Site G one, differs in a number of aspects from those of for example Sites F, H and K (see also Roebroeks *et al.* 1992). Generally, this could be an indication that specifically selected and well-prepared tools and blanks were brought to the 'low density' locations for possible use (*cf.* Site G). Also the relatively large number of unretouched chips and few larger flakes seem to have been produced from transported cores (*cf.* Site C). The area was probably visited over and over again, during a number of 'short' unrelated events. Remarkable in the light of the 'taphonomic' heterogeneity is the technological and typo-logical uniformity of the tools. A statement that becomes even more conspicuous if one takes all transported implements at Belvédère into account. Compare for example the scraper-part of the Site N and K 'toolkits' (Section 5.4.3.4).

According to the above presented Belvédère data, it seems legitimate to conclude that early human behaviour was probably responsible for the main inter-assemblage variations. In the following section these behavioural patterns will be discussed in more detail.

5.6 Explaining the inter-assemblage variability

5.6.1 Introduction

The 'scatters and patches' at Belvédère seem to represent 'ideal' conditions for interpreting early human behaviour. The excavated interglacial land surfaces in the river Meuse valley bottom were sealed in a 'short' period of time, and in a calm sedimentary environment, leaving the archaeological remains of human occupation almost 'untouched'. This resulted in a promising research situation where many artefacts could be refitted, tools exhibit microscopic traces of use, and various faunal remains were still present. As a result the Saalian archaeological levels present precious information on the used technological strategies (Roebroeks 1988; Roebroeks *et al.* 1992, 1993; Schlanger 1994, 1996; De Loecker 1992, 1993), palaeo-environments (Vandenberghe *et al.* 1993), and sporadically early human food procurement (Roebroeks 1988; van Gijn 1988, 1989).

It should be realized that the mentioned 'high and low density' distributions do not form separate and clearly defined spatial units. In fact, all Belvédère artefact distributions take a position on a sliding scale somewhere between the areas with the highest densities at Site K and the areas with lowest densities at Site N. The patches may therefore represent spatial accumulations of lithics, which were discarded during several different and unrelated events. Alternatively, however, the typo-/technological characterization and the refitting analysis showed that there are some striking qualitative and qualitative differences between both 'types' of findspots, (Roebroeks *et al.* 1992; Section 5.4.3). Therefore, it can be said that the Maastricht-Belvédère find distributions do indeed reveal specific and valuable information on the spatial organization of Middle Palaeolithic humans (technology), but only on a more 'generalized' level.

In general two major factors seem to be responsible for the discrepancies between the 'high and low density' distributions. In the first place refitting evidence showed that the scatters and patches represent different trajectories within the life histories of Middle Palaeolithic flake technologies, *i.e.* of tools, flakes and cores. At one end of the continuum are Sites K, F and H where reduction sequences 'started' and the degree of importation is relatively low, except for some well-prepared scrapers and points (Site K). At the other end there are the 'low density' Site G and N scatters, were well-prepared and imported flake technologies came to their end ('worn-out' tools and cores). As an 'intermediate' stage Site C can be mentioned. At this patch the refitted raw mate-rials reflect different ways of on-site knapping, *i.e.* working a flint nodule into a prepared core, production of flakes from imported and well-prepared cores and export of large well-prepared flakes and cores. It can therefore be suggested that the 'high density' patches and 'low density' scatters reflect different places in the spatial organization of the technologies.

Secondly, it seems reasonable to assume that the observed discrepancies are related to the execution of different activities. On the one hand, it can be suggested (Roebroeks *et al* 1992) that the 'high density' patterns predominantly reflect the maintenance of technology (*i.e.* preparation and production of new cores, flakes and tools) in combination with some minor tool/flake use. The 'low density' scatters, on the other hand, might be related to the actual use of these technologies in direct food procurement or 'non-maintenance' activities (*cf.* Isaac 1981) like scavenging or hunting. The fact that nearly all the Site N (and G) lithics were discarded away from their place of manufacture, together with the butchering event of a young rhinoceros at Site G (Roebroeks 1988), supports this hypothesis.

5.6.2 Typo-/technological and raw material patterns in the inter-assemblage variability

A systematic study of the lithic technology and the used raw materials (see Chapters 3 and 4) can provide precious information on the 'economic' and technological activities which were carried out in specific areas of the Belvédère locale. Moreover, the strategies by which the local raw materials sources were exploited and the manner in which produced and selected lithic artefacts were distributed over the landscape could give important clues to the observed inter-assemblage variability. The latter items which documented, without doubt, early human patterns of movement will be dealt with later (see Section 5.6.3). To illustrate the Maastricht-Belvédère situation, Table 5.21 is given as an overview (guideline) of lithic behaviour. This illustration will be (can be) constantly referred to (consulted).

The typo-/technological analysis of the excavated scatters and patches at Belvédère shows generally two 'different' core reduction strategies which were simultaneously applied in the same Saalian 'cultural' system (*cf.* Roebroeks 1988). For both approaches the emphasis was clearly on the production of flakes and flake-tools.

Firstly, at most of the find occurrences the use of a *débitage discoïde*, marked by a 'self-acting' preparation, was documented (Boëda 1993; *i.e.* Sites F, H and K). Especially at Site K the disc/discoidal core approach ('unifacial' disc[oidal] and interchanging bifacial discoidal) is well documented by means of refitting (see Section 3.7.3).

Secondly, besides this *débitage discoïde* some of the find distributions are characterized by the presence of *débitage Levallois* products (Bordes 1961; Boëda 1984, 1986, 1988, 1993). Generally two different modes of operation can be discriminated. On the one hand, there is the 'classic' Levallois technique (*éclat préférentiel*), which is rather seldom represented in the Belvédère sample. In fact its presence could mainly be documented by a number of 'isolated' transported flakes and especially scrapers (*i.e.* Sites N and K). On the other hand, technology and refitting indicate the application of a *débitage Levallois recurrent* at Site C. From the initial stages of core preparation on this approach is intended to produce a 'continuous' series of predetermined flakes. The latter are knapped from one and the same carefully prepared striking surface of a core. In this sense the *recurrent* approach is much more economical than the 'classic' approach.

Furthermore, it has to be mentioned that only the Site C assemblage (and possibly also the Site K one) shows evidence of preparation and production of Levallois (*recurrent*) flakes on the spot, be it on well-prepared transported cores (Roebroeks 1988; Schlanger 1994, 1996).

Given these two 'different' core reduction strategies (disc/discoidal *versus* Levallois), the Belvédère data shows that the observed technological patterns are not tied to specific findspots. Moreover, it seems that the disc(oidal) technique was often employed alongside the Levallois method. For example at Site K, where the reduction was basically focused on a disc(oidal) core approach, clear Levallois *sensu stricto* products were described as well. They appear in the assemblage as 'isolated' transported items, or were possibly scarcely produced on the spot (Section 3.7.3). Also the Site C analysis confirms the fact that a Levallois *recurrent* method was used alongside a less dominant disc(oidal) core approach (Roebroeks 1988).

If the (conjoined groups of) artefacts, recovered within the same excavated areas and representing a Levallois or a disc(oidal) core reduction, were indeed discarded during short contemporaneous activities, which at Site K is (probably) the case, then the following questions can be relevant for the observed differences:

1. In how far can the Levallois technique, documented at Sites C, N and K, really be discriminated from a disc(coidal) core technology (Sites K, F, H and C)?
2. And what were the crucial factors for opting for one of the previously described technological approaches?

It has already been mentioned in earlier publications (Boëda 1993; Mellars 1996) that most technological aspects of disc(oidal) core techniques are in fact very similar to Levallois core approaches (or *visa versa*). In this context Mellars (1996) can be quoted:

> "The disc-core techniques were reliant on precisely the same basic sequences of core preparation as that in the classic Levallois techniques, involving the initial preparation of a continuous striking platform around the perimeter of this nodule, followed by successive removals of flakes from the upper (striking, DDL) surface of this nodule. The only criterion for differentiating between the two techniques (Levallois on the one hand, and disc-core on the other) seems to lie in the varying degrees of special preparation applied to the upper (striking, DDL) surface of the core. … (it is therefore more, DDL) a matter of degree rather than of kind." (Mellars 1996:73).

It can also be suggested that both mentioned reduction strategies were designed (at least at Belvédère) for the production of rather 'large and wide' flakes. Moreover, Levallois as well as disc(oidal) core approaches can produce a wide range of specific and similar flake types, from pseudo-Levallois points and *éclats débordants* (backed knives) to ordinary flakes with large cutting edges as shown at Site K. Even Levallois *sensu stricto* flakes can be produced, using a disc(oidal) technique. It seems therefore again plausible that the observed discrepancy between the two modes of production lies more in the conscious efforts of systematically shaping/preparing the core, which obviously was used for future main flake removals.

Besides the technological possibility that disc(oidal) core approaches might be classified under a wider grouping of Levallois approaches, there is more proof of a direct link between both techniques of flaking. The Middle Palaeolithic data-set provides some examples which show core types intermediate between typical Levallois and disc cores. Apparently the latter seem to represent the heavily reduced end-products of flaking strategies in which well-prepared Levallois cores were transformed into other types like disc(oidal) nuclei (*cf.* Boëda 1993:393; Vynckier *et al.* 1988:135). In other words, the cores/nodules were reduced from larger and more complex to smaller and more simple. Alongside transporting behaviour, this could explain the fact that in some cases Levallois *sensu stricto* flakes are clearly represented, although their parent cores are completely lacking. As an example the possible Levallois (-like) flake sequence at Site K, which appears in a 'unifacial' disc(oidal) core reduction, can be mentioned (see composition III [part A], Section 3.6.5.4).

If it is correct to interpret the disc(oidal) and Levallois techniques as belonging to one and the same group of core approaches, which basically represent different degrees of core preparation, what were then the factors for opting for one of them? Answers to this question could amongst others, possibly, be found in the grain-size and quality of the used raw materials. A technological approach linked to the grain-size, quality and availability of sufficient raw material is amongst others assumed for the Site K assemblage. As mentioned before (Section 3.7.3), analysis of this 'high density' patch shows that the bulk of used raw materials was procured from local secondary sources (*i.e.* fluviatile transported material). Virtually all these raw materials show natural imperfections like frost fissures and fossil inclusions. The flint looks rather coarse-grained and can therefore be described as 'inferior' quality raw material. A disc(oidal) technology was mainly applied for the reduction of these nodules/cores. All this also applies to the Site H and F assemblages. The use (choice) of this technique is, however, not surprising as it is a very flexible flaking strategy in which technological errors can be 'easily' repaired and the multiple natural imperfections can be surmounted quite economically (*cf.* Boëda 1993). When a finer-grained and less frost-affected part of a flint nodule was used, it seems that the striking surface and striking platform of the core were better or more often prepared, resulting in Levallois (-like) sequences (*éclats préférentiel*). It can therefore be suggested that the early humans slightly adjusted their technological strategy to the given raw material quality. The few imported Site K Levallois flakes *sensu stricto* were produced on rather fine-grained raw materials, which scarcely show natural fissures. With respect to the presence of Levallois products, again the use of very fine-grained flint (with very few 'flaws') at Site C can be mentioned. Here the 'better' quality raw materials were used for the production of *débitage Levallois recurrent* items (Roebroeks 1988:30, 47-52; see also Chapter 4). The products were imported as finished flakes or locally produced from imported and well-prepared cores. Remarkably, a less dominant disc(oidal) technique, applied on coarser-grained flint cores, was employed alongside the Levallois approach. The several 'isolated' Levallois flakes, recovered from the 'low density' Site N area, seem to be also produced from rather fine-grained raw materials with few natural fissures.

Sites	On the spot				Import			Export		
	Decortication	Flake production	Tool production	Resharpening, recycling	Flakes	Cores	Tools	Flakes	Cores	Tools
A	‘Moderate’	‘Moderate’	Absent	Rare	Rare	Absent	Rare	Absent	Absent	Rare (resharpened tool)
B	Absent	Rare	Absent	Absent	Rare (prep.)	Rare	Absent	Absent	Rare	Absent
C	Moderate	Intensive (few nodules)	Rare	Absent	Rare (well-prep.)	Frequent (well-prep.)	Rare	Rare (well-prep.)	Frequent (well-prep.)	Absent
D	Absent	‘Moderate’	Absent	Absent	Rare	Rare (disc core)	Absent	Absent	Absent	Absent
F	Intensive	Intensive	Rare	Absent	Absent	Absent	Absent	Absent	Absent	Absent
G	Absent	Rare	Rare	Rare	Frequent (well-prep.)	Rare	Frequent (prep.)	Absent	Rare	Rare (resharpened tool)
H	Absent	Intensive	Absent	Absent	Absent	Absent	Rare	Absent	Absent	Absent
K	Intensive	Intensive (many nodules)	Rare	Rare	Rare	Absent	Moderate (well-prep.)	Absent	Absent	Rare (resharpened tool)
N	Absent	Rare	Absent	Absent	Frequent (well-prep.)	Rare (disc core)	Frequent (well-prep.)	Absent	Rare (prep.)	Absent
July ’90	‘Intensive’	‘Intensive’	Rare	Absent	Rare	Rare	Absent	Absent	Absent	Absent

Sites	Technology and 'site function'				
	Core reduction strategy	**Levallois reduction strategy**	***Chaînes opératoires***	**Flake/tool use**	**Interpretation**
A	Unprepared	Absent	Some stages	?	Flake production, possibly associated with minor flake/tool use and tool rejuvenation
B	Prepared?	Absent	Some stages	?	Minor flake production, possibly associated with minor flake use
C	Disc/discoidal (moderate)	Frequent (Lev. recurrent)	Several stages (on different nodules)	Meat procurement	Core preparation and episodes of flake production, associated with minor flake/tool use (palimpsest of several events)
D	Disc/discoidal	Absent	Some stages	?	Minor flake production
F	Disc/discoidal (frequent)	Absent	All stages	Meat procurement?	Flake production, possibly associated with minor tool use
G	Prepared	Absent	Some stages	Meat procurement	Core-edge rejuvenation and minor flake production, associated with flake/tool use and tool rejuvenation (palimpsest of several events)
H	Disc/discoidal (frequent)	Absent	Several stages	?	Flake production, possibly associated with minor flake/tool use
K	Disc/discoidal (frequent)	Rare (mainly on scrapers)	All stages	?	Flake production, possibly associated with minor flake/tool use and tool rejuvenation ('Single event' + 'background scatter')
N	Well-prepared	Moderate (mainly on scrapers)	Some stages	?	Core-edge rejuvenation, possibly associated with flake/tool use (palimpsest of several events)
July '90	Unprepared	Absent	Several stages	?	Flake production, possibly associated with minor tool use

Table 5.21: Maastricht-Belvédère. Summary of lithic behaviour for the Unit IV assemblages. The areas in grey are 'low-density' distributions.

In conclusion the following statements can be made. Generally, it seems that most of the 'high density' assemblages (*i.e.* Sites H, F and K), representing major flint knapping activities on the spot, were made from locally available, but 'inferior' quality, raw materials. Moreover, disc(oidal) core reduction strategies were predominantly used. When a Levallois core-approach could be described, it was mostly on 'fine' grained and/or transported materials. In contrast to the earlier mentioned patches, there are a number of findspots where the majority of the assemblages is characterized by the presence of imported items. The latter were made on a large variety of 'better' quality raw materials, deriving from some unknown distance (*i.e.* Site C and the 'low density' G and N scatters). The items were brought to the excavated areas as selected flake blanks, finished tools (Sites G, N and K) or as cores intended for future flake/tool production (Site C). Some of these artefacts were introduced as Levallois products, which were predominantly made of fine-grained flint types.

It can therefore be suggested that 'high' quality flint material, meaning fine-grained and without fissures, was presumably preferred and highly valued for its superior flaking qualities. Seemingly, it allows maximum control over the precise form and intensions of knapping. The mentioned natural 'errors' in the locally available flint could ruin an entire Levallois reduction sequence and/or its end-product(s) in an irreparable way. Stated differently, the fact that most of the locally procured flint nodules were made of such an 'inferior' raw material quality could generally explain the rather limited presence of a Levallois core approach at Maastricht-Belvédère. Apparently the local flint, deriving from the river/gravel beds, seem to have been avoided for Levallois applications. The early humans possibly focused on a disc(oidal) core approach in which flaking errors could have been more easily restored. It can, furthermore, be suggested that the use of a disc(oidal) core approach at the Belvédère locale was mainly applied as a response to the 'inferior' quality raw materials. The use of large quantities of local and inferior quality flint could be seen as a largely predictable aspect of procurement strategies which were 'embedded' in more general patterns of carried-out subsistence activities.

The presented data indicates a relationship between particular kinds of raw material and the use of certain flaking techniques/modes. The varying frequencies in which different raw materials were transported across the landscape shows, furthermore, a link with the morphology of these items (amongst others prepared cores, Levallois flakes and/or retouched tools) and the different patterns of use at specific findspots (*cf.* Roebroeks *et al.* 1988*b*). In the next section the Maastricht-Belvédère data on lithic transport will be discussed in more detail.

5.6.3 Early human transport of lithics

The refitting and raw material studies at most of the Belvédère patches, and especially the scatters, indicate that typo-/technological differences may well have been related to aspects of early human mobility. The analysed assemblages show that a number of large flakes and tools entered the excavated surfaces as 'isolated' and finished items. Some tools had previously been resharpened many times (*i.e.* Sites K and N). Moreover, there are areas where (prepared) cores were introduced, which were subsequently further reduced and/or prepared 'on the spot'. Sometimes these cores were discarded as worn out items (*i.e.* Sites C, D, and N), while in other cases they were transported to other locations (*i.e.* Sites B, C, G and N) for further/future use (Table 5.21). This might well be one of the reasons why most of the find occurrences contain few cores. The Site A, D, N and Section finds are only represented by one (exhausted) example, while Sites H, G as well as the 'July 1990' test pit, do not contain any cores at all. Transport of tools and/or flakes away from the excavated findspots is more difficult to prove. Only the non-conjoinable (re)sharpening flakes at Sites A, G and K clearly indicate that tools were recycled for future use somewhere else. Refitting also shows that some of the larger and locally produced Site C flakes were transported to other areas. In this context Roebroeks (1988:135) speaks of "cores, flakes and tools [which, DDL] were manufactured, transported, used and discarded at rates dictated by the anticipation of activities on the one hand and the needs of the moment on the other". Judging from their morphology it can be assumed that most of the items were transported from one area to another in anticipation of future needs of suitable 'cutting edges'. The Site G micro-wear analysis gives supporting evidence for this hypothesis (Roebroeks 1988; van Gijn 1988, 1989).

The typo-/technological Belvédère data shows that in most cases a specific selection of items was transported from one place to another, *e.g.* well-prepared cores, large (Levallois) flakes, backed knives and scrapers. In the next part some of these find categories will be dealt with in the context of inter-assemblage variability. Initially the scrapers and Levallois products will be looked at.

According to the typological classification of the tools, most of the assemblages consist of few scrapers (Table 5.11). However, at Sites K and N a relatively large number of well-made Mousterian points and (convergent) side scrapers was found. All were produced on rather fine-grained and 'exotic' flint types. This together with the fact that only two scrapers of all 104 Belvédère examples could be conjoined to the rest of the assemblages (*i.e.* Site K, refitted composition II part E and XVII, respectively Sections 3.6.5.3 and 3.6.5.15), indicates that these tools were most probably part of a transported 'toolkit'. At Belvédère specific forms of large, wide and sometimes well-prepared blanks were either produced or selected for the production of side scrapers (transversal forms are very scarce). It can even be suggested that the 'scarcely' appearing 'classic' Levallois flakes were selectively used, to be retouched in rather standardized scrapers with equal forms, similar measurements and long 'cutting edges'. Compare for example the scraper assemblages of Site K and Site N (Section 5.4.3.4). The fact that these items appear in different numbers at certain locations, together with the variations in scraper morphology, could possibly explain the inter-site differences.

Scrapers are very elementary tools, which are characterized by two basic features (Bordes 1961; Mellars 1996). The (major) retouched edges are mostly located along one of the longest margins of the used blank, while the actual retouch was clearly intended to produce a regular and 'sharp' working edge. Several use-wear studies (amongst others Beyries 1987, 1993 and Roebroeks *et al*. 1997) confirmed the fact that the retouched parts were indeed intended as working edges. It has, furthermore, been demonstrated by regional and site-oriented analyses that typological variations occurring in and between Middle Palaeolithic assemblages are frequently related to re-use of tools (Dibble 1987*a* and *b*). During the process of intentionally extending the 'use-lives' of tools, re-modifications can occur repeatedly. This progressive resharpening of the edges (during use) often leads to a typological transformation of a tool (Fonton *et al*. 1991; Roebroeks *et al*. 1997). According to some authors (Dibble 1987*a* and *b*; Dibble and Rolland 1992) specific scraper types may, therefore, be interpreted as subsequent stages in the 'use-lives' of tools (*cf*. Section 3.7.4). In an idealized scenario, scrapers could have started their 'use-life' as unretouched flakes, which were only systematically retouched as their originally sharp edges became 'worn out' and/or damaged. During repeated phases of resharpening, single side scrapers could have been reduced to double side scrapers and subsequently to convergent and/or pointed side scrapers. Logically, this remodification and/or reuse reduces the scrapers in size, while the edges become steeper, leading eventually to tools displaying a 'Quina-like' retouch. In Dibble's (1987*a* and *b*) model, assemblages consisting of large numbers of simple side scrapers could be interpreted as reflecting less intense utilization (and reduction) of tools, while assemblages with large numbers of double and convergent side scrapers may reflect a more intensive use of the implements. In other words, the degree to which the resharpening processes were carried out could explain the variations in scraper forms and the frequencies in which they appear at different Middle Palaeolithic locations.

Several publications showed that there is also a relationship between the intensity of retouch and the distance of transport (Geneste 1985, 1988; Roebroeks *et al*. 1988*b*). As an example the spatial distribution of Middle Palaeolithic artefacts produced from phtanite in the Belgian Meuse area was mentioned by Roebroeks *et al*. (1988*b*). Here retouched flakes were generally discarded at much larger distances from the flint source than non-retouched flakes and cores. In a number of cases, like the cave sites of Trou Magrite and Trou du Diable (Ulrix-Closset 1975), transport involves distances exceeding 50 kilometres from the source area. Similar relationships between the intensity of retouch and the distance of transport have been documented for other Middle Palaeolithic locations, such as the Grotte Vaufrey in southwestern France (Geneste 1985, 1988) and the volcano sites in the German Neuwied Basin (Floss 1990, 1994). It is worth mentioning that besides scrapers also for other select typological groups of items a relationship between the intensity of retouch and the distances of transport is noticed (*i.e*. bifacial implements, *cf*. Bordes 1972; Bosinski *et al*. 1986; Kröger 1987). For the Middle Palaeolithic of the Aquitaine area in France, Geneste (1985) actually collected data for a link between Levallois products fabricated on transported raw materials and the occurrence of Mousterian points and side scrapers. All this implies that specific technologies executed on particular raw materials, together with sequences of re-use and typological transformations, often show a spatial distribution which is significant for our understanding of early human behaviour.

The previous statements offer some plausible explanations for the described differences in and between the 'high and low' density find distributions at Maastricht-Belvédère. The heavily reduced Site K and N scrapers, which are in many cases well produced, well prepared (Levallois), mostly on 'exotic' raw materials and above all non-conjoinable, are probably 'curated' items (Binford 1973; Bamforth 1986; Odell 1996). Apparently the blunted or damaged scraper edges were systematically (re)sharpened over and over again. This together with the few mentioned (non-conjoinable) 'transversal and long sharpening flakes' at Sites A, G and K gives positive proof that scrapers were indeed recycled in the system and that they were taken from one locus to another. Moreover, the intra-Saalian evidence does not support the idea that blanks were reduced into characteristic scraper forms as a consequence of continuous and intensive tool retouching/maintenance at the location of primary flake production (*cf*. [Weichselian] Site J, Roebroeks *et al*. 1997). It can probably also be concluded that this recycling behaviour was not intended to anticipate a scarcity of local raw materials. For example, in the 'high' density Site K distribution it is difficult to understand why intensive retouched and resharpened scrapers were introduced when there were sufficient unretouched flakes (assuming that they are contemporaneous) with large 'cutting edges' readily available. Additionally Sites H, F and K could suggest that raw material nodules in the vicinity of these findspots were plenty and immediately accessible. Supposedly the early human expertise on the local flint quality was developed to such an extent that, amongst others, scrapers on 'first-rate' materials, were carried through the landscape to support (Site K) or substitute (Site N) the 'lesser' quality flint found in the Pleistocene gravel beds of the river Meuse. It can therefore again be suggested that 'high' quality flint material was preferred and specially selected for the production of well-prepared items, which were probably intended to function for a longer time in the system. The fact that at Sites K and N a mixture of single-, double-sided and convergent scrapers were recovered could indicate that some were discarded after less intense use and remodification, while others were extensively used and eventually disposed of as 'worn out' implements (*i.e.* convergent side scrapers and Mousterian points). In other words the scrapers could have been dumped during different stages of the resharpening (use-live) processes.

Refitting and raw material studies also show that besides scrapers also cores and large unretouched flakes were transported. Especially the Site C analysis indicates that well-prepared cores (amongst others *Levallois recurrent*) entered the excavated area in an already reduced form. Some were further reduced and eventually discarded on the spot as 'worn out' items. Heavily exhausted cores were also recovered at Sites D and N (*débitage discoïde*). Other examples entered the excavated surfaces in a flaked form, where they were further prepared and/or reduced, to be subsequently transported to other locations (Sites B, C, G and N). In yet other cases (Site C) 'new' flint nodules were initially decorticated and prepared to be exported for future use. Like for the scrapers these patterns indicate that artefacts (cores) were carried around and discarded during different stages of reduction. All this is clearly in contrast with core reduction sequences at the 'high' density Site F, H and K assemblages. Here, the flint nodules were decorticated, scarcely prepared, reduced and eventually discarded at one and the same place. Unlike the latter occurrences, core preparation and core morphology at Sites C, G and N is generally related to transport of artefacts. In this sense the use of a Levallois technique (and especially the *recurrent* type at Site C) could represent an economizing behaviour towards the transported raw materials.

Part of the transported Belvédère 'toolkits' also consisted of large unretouched flakes of which a few are described as Levallois *sensu stricto* (Sites C, K and N). Mainly at Site C, analysis showed that Levallois *recurrent* flakes, produced outside the excavated area, entered the locus (together with the cores?) to be used and rejected on the spot. Moreover at nearly all findspots large flakes were recovered which differ in raw material than the rest of the assemblages. In addition they could not be refitted (dorsal/ventral) and often show macroscopic signs of use. This suggests that flakes, selected from previous knapping episodes, were transported to other areas for immediate/direct use (without modifications). At Site K one of these large imported flakes was used for the production of tools. The artefact was 'split' and modified into a burin and a notched implement (refitted composition XVI, Section 3.6.5.15).

The Maastricht-Belvédère data also shows that not only well-prepared cores, scrapers and ordinary (Levallois) flakes were transported. At Site G, and especially at Site N, a number of *éclats débordants* (*cf.* Beyries and Boëda 1983) were described. Technologically these flakes, struck in an 'offset-axe' direction, are vital in the 'preparation' and 'maintenance' of suitable core edge angles (*i.e.* disc[coidal] as well as Levallois *recurrent* core approaches). As mentioned before the raw material study together with the negative refitting results clearly show that within these 'low density' scatters almost all artefacts were imported. They were selected from the products of previous knapping episodes outside the excavated areas (Roebroeks *et al.* 1992). This makes the mentioned *éclats débordants* rather conspicuous and indicates that something else is going on as well with these 'core trimming element-like' flakes. There are two very typical examples present in the Site N assemblage, and nine flakes with a comparable form, *i.e.* flakes with a straight and sharp cutting edge, a back consisting of the side of a core and triangular in cross-section. Morphologically all these flakes can also be considered as 'backed knives'. In the context of Sites N and G (see the large 'backed knife', Roebroeks 1988) it seems, therefore, that the *éclats débordants* were obviously more than just waste. One could assume that this category of flakes, produced during core maintenance activities (as at Sites F, H and K), were singled out to be transported to other locations where technology was used. Such observations can put, according to Roebroeks *et al.* (1992), the whole practice of ordering debitage products into 'preparation' and 'selected' items into question.

In conclusion, the Belvédère data probably shows that well-prepared toolkits, mainly on 'first-rate' flint (fine-grained and without natural fissures), were transported from one location to another through the Meuse valley bottom landscape. The presence of already reduced and prepared *débitage Levallois recurrent* cores at Site C, the relatively few retouched items on non-conjoinable 'exotic' flint (*i.e.* scrapers and Mousterian points made on Levallois *sensu stricto* flakes) at Sites K and N, the selected 'backed knives' at Sites G and N and the unretouched 'isolated' (Levallois) flakes at Sites C, G, K and N give significant evidence for this assumption. It is, however, clear that in all cases we are dealing with discard of (prepared) 'finished' items and not with transport of larger (unprepared) raw material blocks/

nodules. The short distance transportation of large unprepared and untested raw material nodules at Site K can probably be regarded as an exception for the Belvédère situation. In addition, these blocks were probably not intended to serve longer periods of time in the 'transportation-circuit'. They were 'selected' for nearby expedient use.

It can, furthermore, be suggested that the mentioned cores, scrapers, 'backed knives' and (Levallois) flakes were introduced to the excavated areas to support (Sites C and K) or substitute (Sites G and N) the locally available, 'inferior' quality, raw materials during use. It seems that tools and cores may represent the 'intermediate' stages in the 'use-life' histories of Middle Palaeolithic technologies. After being used (and resharpened) at certain loci some implements were probably transported to other areas, where further use (and modification) took place. Eventually some of the artefacts were discarded in a final 'worn-out' form. This could point to the Belvédère locations reflecting different stages within a 'single' technological cycle of flake, tool and core use. It also indicates a certain anticipation of future use and therefore some kind of 'planning-depth' is suggested (Binford 1989).

As Roebroeks *et al.* (1988*b*) already mentioned specific artefacts were occasionally transported over large distances (up to 100 km) from their geological sources in the Middle Palaeolithic. This is probably one of the factors which affected the continuous transformation of the morphology of lithic artefacts. Generally resharpening (and/or knapping) events along the way were responsible for the fact that heavily retouched (and/or flaked) items were discarded at greater distances than non-retouched items (*cf.* Geneste 1985, 1988; Ulrix-Closset 1975). In the context of the Belvédère sites it is, however, very difficult, or even impossible, to assign distances to this transport. In fact this may have been very limited as most of the recovered flint types occur in the local gravel beds of the Pleistocene river Meuse.

All in all, the Belvédère 'tool' assemblages show a correlation between the import of items, the raw material characteristics, the used core approach (technology) and the intensity of retouch (tool typology). Moreover, the 'dynamic' model, centred around the differential transport of flint artefacts for future use, or for further reworking, partly offers an explanation for the Middle Palaeolithic inter-assemblage differences.

5.6.4 Expedient patterns in use of technology

As mentioned before, relationships between particular kinds of raw materials, particular technologies and specific kinds of retouched tools, linked to transporting behaviour, is not unique for the Belvédère situation. It has been frequently described for the Middle Palaeolithic record (Geneste 1985, 1988; Roebroeks *et al.* 1988*b*). Moreover, according to Geneste's study of the French Aquitaine area (1985), there is an unambiguous distinction in terms of typology and technology between locally produced, 'expedient' components, on the one hand, and the transported implements on the other hand. Geneste noticed that scrapers occurring on Levallois products were scarcely produced on local materials. Local raw materials were more often used for the production of morphologically simpler and smaller tools, *i.e.* denticulates, abrupt and irregularly retouched tools and notched pieces. This may possibly reflect the *ad hoc* nature of the latter tools. They could have been made from what lay immediately to hand during episodes of primary flint knapping and were discarded very close to their production areas (Geneste 1985).

Similar patterns are for example known from the upper (Saalian) levels E-5 at La Cotte de St. Brélade on the island of Jersey (Callow and Cornford 1986). Again, there is a clear relationship between the import of 'good' quality flint and the occurrence of well-made scrapers, points and handaxes. Denticulates and notched tools from these levels are often made from other materials, like quartz. The latter must have been collected in the surroundings of the cliff location. At Saint-Vaast-la Hougue, Normandy (France), two different strategies are identifiable in the archaeological levels dating from the late Eemian interglacial and/or Early Weichselian (Fosse *et al.* 1986). The lithic assemblages from the *Horizons Inférieurs*, situated in beach deposits, are made of a coarse-grained flint that was probably collected in the vicinity of the location. Prepared cores and/or flakes are rare, while denticulates and notched pieces dominate among the retouched tools. In the *Horizons Supérieurs*, stratigraphically situated in a loess head, assemblages made of fine-grained 'exotic' flint, imported from outcrops some 20 kilometres away, were described. It concerns here Levallois cores and flakes *sensu stricto*, and most of the retouched tools are well-made scrapers (some with Quina retouch). Furthermore, comparable patterns are observed for the Early Weichselian location of Sclayn (Otte 1992; Otte *et al.* 1988, 1998) in the Belgian Meuse area, close to Southern Limburg region.

Compared to these northwest European examples, it seems possible that such a 'binary pattern' (*cf.* Geneste 1985, 1988; Roebroeks *et al.* 1988*b*; Dibble and Rolland 1992) is also present within the Maastricht-Belvédère Unit IV levels (Table 5.21). Besides the previously described transported implements on fine-grained and minor flaw influenced 'exotic' flint (Section 5.6.3), the expedient nature of technologies is indicated by the lithic strategies employed at Sites F, H and K. These locations are characterized by intensive knapping episodes and the use of local materials, which were procured at close distance to the primary flaking areas. That these raw materials were indeed collected from nearby sources (gravel beds of the river Meuse) is pointed out by the large and heavy nodules, which could be almost entirely conjoined at Site K. Refitting also shows that 'complete' technological sequences were discarded at their place of production; *i.e.* from the initial decortication stages, through the production of flakes and tools up to the discard of these flakes, cores and 'worn-out' tools.

In addition, it seems sometimes possible to detect a 'binary pattern', or at least inter-assemblage differences, in the spatial distribution of the refitted compositions. Some of the Belvédère sites represent core reduction sequences that largely overlap spatially (Site K), whereas others represent sequences that succeeded each other both in space and time (Site C). At Site C the spatial configuration seems to represent flint-working events of which the products were transported from one locus to another, where they were then abandoned and where a new reduction sequence 'started'. Next, this new flaking sequence (or core) was transported to a 'third' locus where its use-life again ended and where yet again a new one 'started'. This went on until a sequence left the excavated area. This chain of 'single' connections or 'locus-hopping' can be described as spatially diachronic and reflects a certain mobility (Figure 5.2). At Site K, on the other hand, the spatial layout of the conjoined nodules echoes a more static and contemporaneous pattern. Here, the different activity loci are connected by multi-connections of refits and the sequences actually stay 'within' the site boundaries. It seems that lithic technology was transported, over and over again, between the 'same' activity areas within the excavated area. The horizontal configurations at Site K can therefore be described as spatially synchronic (Figure 5.2).

As illustrated in previous sections, the rather sophisticated form of Levallois *recurrent* documented for Site C contrasts conspicuously with the non-prepared (non-Levallois) core reduction practised at Sites H, F and K. These patches could indicate a relationship between the expedient use of 'poorer' and coarser-grained raw materials, the use of disc(oidal) core reduction techniques and the production/use of 'morphologically simpler' implements. Denticulates, notched pieces, burins, and borers rarely occur in the assemblages. However when they do occur, it is mostly in the patchy find distributions and in most cases they could be refitted (*Aufeinanderpassungen*). Table 5.11 shows that of a total of six Belvédère notches, five were recovered at Site K and one at Site M. The single borer and burin were excavated at respectively Sites F and K. Furthermore, six denticulates came from the Site K area and one from the Site N area. The latter implement seems to be an exception in the context of this supposed expedient pattern, as it comes from a low density scatter. It is, however, possible that we are dealing here with a transported 'worn-out' tool, which was re-modified many times and was transformed morphologically (*cf.* Roebroeks *et al.* 1997) through time and space (c*f.* Dibble 1987*a* and *b*). It could also not be refitted. Especially at Site K we can (spatially) see that notches and denticulates (and the burin) were *ad hoc* produced to possibly assist the more sophisticated and mostly imported 'toolkit'. It can be suggested that notches and denticulated tools, in contrast to the transported implements, impose far fewer demands on the skill of the flint worker or the used raw materials.

It seems that at least part(s) of the Belvédère assemblages, and especially the high density patches, represent expedient events of which the products were in direct support of the main transported 'toolkits'. In other words the implements which reflect highly mobile behaviour were *ad hoc* supported by locally procured and produced materials. The use of local flints, collected from river beds, could have provided an almost unlimited and immediately accessible source of raw materials. The *ad hoc* produced 'cutting implements' and cores were at Belvédère of a lesser quality flint (flint with many natural fissures and coarse-grained) and were a direct technological response to a given situation during 'daily' foraging activities. Nevertheless, these expedient lithics were almost immediately discarded after use, at the location of manufacture and/or use (*cf.* Site K, Chapter 3). The 'higher quality implements', on the other hand, were deliberately transported further for future use.

5.6.5 Conclusion

It can be concluded that the flint scatters and patches at Belvédère Unit IV contain elements of both 'expedient' and 'curated' technologies. Although some scatters (Maastricht-Belvédère Sites F, H and K) reflect more expedient technologies than others (Sites C, G and N), a 'binary pattern' is clearly present in these Meuse valley find distributions. In attesting the fine-tuned differences, typo-/technological and refitting studies proved to be essential (Chapters 3 and 4; Appendices 2-11). It has to be mentioned, however, that typologically this 'binary pattern' is not so obvious, as most assemblages consist mainly of similar kinds of 'tools': *i.e.* several types of scrapers and points, backed knives and large well-prepared (Levallois) flakes which show limited variations. It is more a matter of overall 'tool' percentages and the presence of 'exotic' raw materials. Moreover, all find distributions at Belvédère can be seen as reflecting essentially a technological strategy, that was flake oriented and that was based on an almost 'continuous' transportation of prepared cores, flakes and relatively few tools. The few retouched tools mostly reflect the discarded relics of 'intermediate' phases in the use-histories of flakes and tools, while intensive re-use of lithics seems to have been an exception. Typological differentiation could have been limited as we are dealing here with assemblages which were mainly discarded during

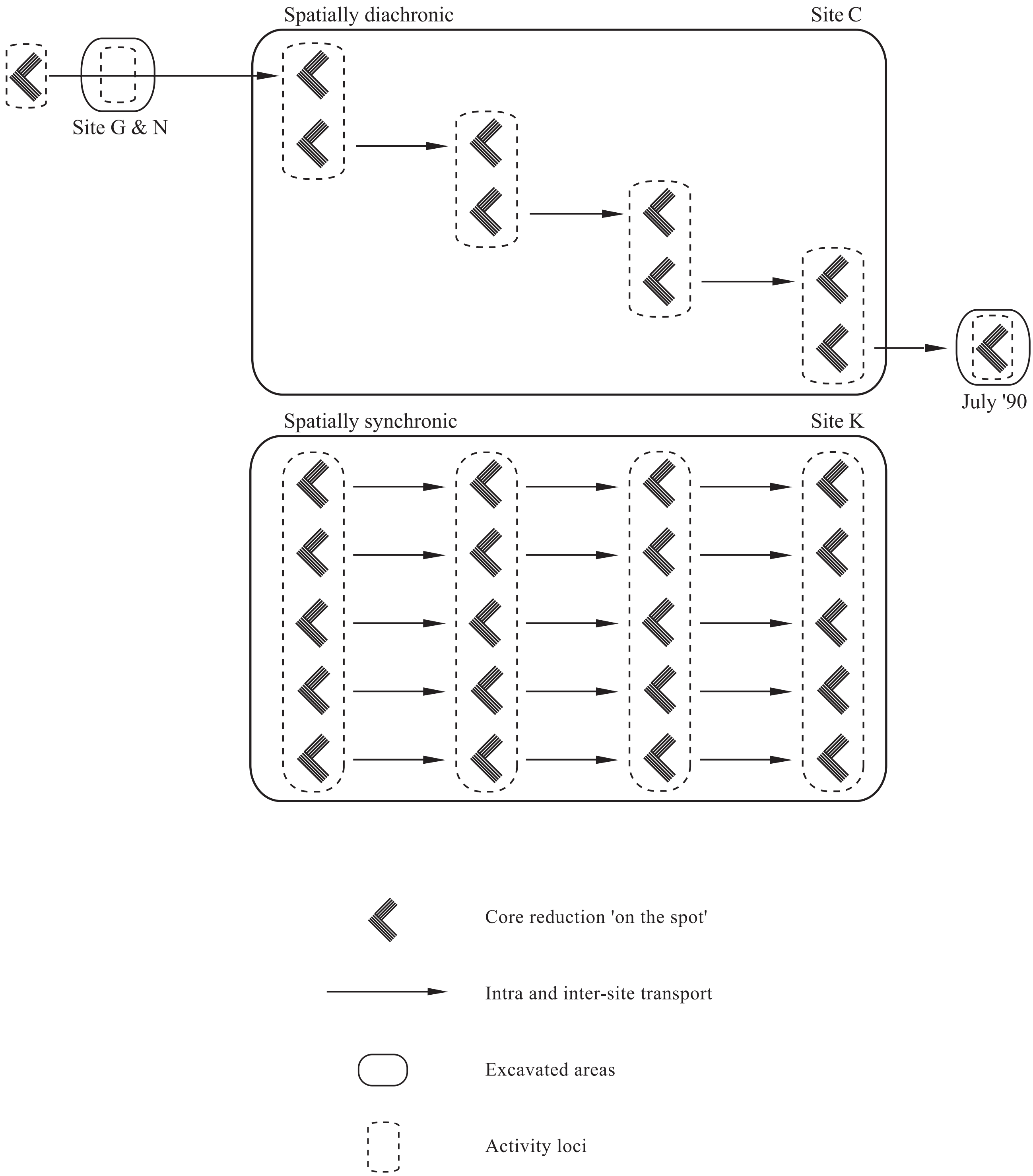


Figure 5.2: Maastricht-Belvédère. Schematic ‘differences’ between the spatial distribution of the refitted compositions (synchronic *versus* diachronic) of the Unit IV sites.

'short' periods of visit in an area with a 'high' sedimentation rate, as compared to the find occurrences outside the valley bottom (see Kolen *et al*. 1998, 1999; Verpoorte *et al*. 2002).

Technologically the 'binary pattern' is more clear. Although the used lithics reflect mainly a very mobile technology, at certain loci (*cf*. Sites C, F, H and K), the transported toolkit seems to have been replenished with an expedient *ad hoc* produced component. Besides the differences in lithic densities, some are higher (Sites F and K) than others (Sites G and N), the more dominant expedient assemblages show, amongst others, the use of local raw materials, larger quantities of decortication flakes, more technological errors (*cf*. Shelley 1990) and large sequences of conjoined artefacts (dorsal/ventral). Moreover, the use of a disc(coidal) technology seems to prevail on locally procured coarser-grained raw materials, while Levallois (*recurrent* as well as *préférentielle*) products on 'exotic' finer-grained flint are more prominent in the transported toolkits.

5.7 Discussion and conclusion

The data collected from ethno-archaeological research (*cf*. Binford 1980, 1982) provides a starting point for studying the spatial organization of settlement and subsistence activities of Palaeolithic hunter-gatherers. At least these studies showed that the behavioural patterns of non-sedentary communities are spatially continuous and that the subsistence activities, executed during mobile strategies, have a direct relation to the discarded materials ('toolkits'). Additionally, these transported and/or *ad hoc* produced relics represent only a very small (material) part of the system in which they functioned and are mostly our only information on 'fossil' behavioural patterns.

Ethno-archaeological research also illustrated that if we want to analyse the 'daily' activities of early human societies we should practise an 'off-site' archaeology (Foley 1981*a*; Isaac 1981).

The study of Middle Palaeolithic off-site patterns at Maastricht-Belvédère showed that when all possible information is integrated in the analysis and if we focus on archaeological landscapes rather than on the 'classic' sites, the potential of small parts of a (micro-)landscape can be rather promising for studying early human behaviour (Roebroeks *et al*. 1992).

When the 'individual actions' (isolated artefacts, single action clusters and clusters of clusters, *cf*. Isaac 1981) are studied on a more (micro-)regional scale, some differences between the sites can be described. The observed differences are probably not only related to taphonomic or post-depositional features but early humans possibly used various places in the landscape for a variety of activities, using and producing 'different' material components.

Excavations of the 250,000 years old Unit IV levels showed that parts of the valley bottom at Belvédère must have been littered with artefacts and bones, indicating that the local environment was frequently visited by early humans during short subsistence activities. This large-scale and 'continuous' artefact distribution, referred to as a 'veil of stones' by Roebroeks *et al*. (1992), looks rather uniform in terms of typology. The find distributions predominantly consist of unmodified flakes and flint knapping debris. When retouched tools do occur, it is generally in small numbers and typological variation is limited. Flakes with microscopic signs of use, backed knives and scrapers are by far the most frequent tool types. The most important inter-site differences at Belvédère are related to variations in artefact density, raw materials and fine-tuned technological features, which were only detected by elaborate refitting and lithic analysis (*cf*. Appendix 1).

The Belvédère analysis, based on Isaac's work in Africa (1981), eventually resulted in the definition of so-called 'high density patches' and 'low density scatters' (Roebroeks *et al*. 1992). Apparently the excavated low density distributions seem to have originally covered large surfaces of the Meuse valley bottom. It is likely that these ('continuous') scatters were formed during many episodes of early human activity, involving the use and discard of 'few' lithics (small 'toolkits'). Within these extensive 'background distributions' one occasionally encounters clearly recognizable concentrations, formed by locally higher densities of artefacts, *i.e*. the 'classic' sites, which mainly consist of waste products of core reduction.

According to raw material qualities, core reduction modes and tool typology (*cf*. Geneste 1985; Roebroeks *et al*. 1988*b*; Féblot-Augustins 1993, 1997, 1999), it has been suggested that the 'sites' contain elements of both 'expedient' and 'curated' strategies. On the one hand there are assemblages made almost exclusively on local raw materials, characterized by a dis(coidal) core approach and sometimes consisting of denticulates, notched pieces and scrapers (Sites F, H and K). On the other hand there are technologies consisting of prepared cores and flakes (Levallois *sensu stricto*) and predominantly well-made scrapers (amongst others Mousterian points) which were produced on 'exotic' materials (Sites C and N). These strategies were not mutually exclusive and were apparently not used in different periods of time.

We were able to find a rough correlation between the occurrence of scatters or patches and the use of, respectively, transported or local raw materials, dis(coidal) or Levallois technologies and scrapers, backed knives and well-prepared flakes or morphologically less sophisticated tool types. The patches consist of vast quantities of *Aufeinanderpassungen* (*cf*. Cziesla 1986, 1990), while the few conjoined artefacts at the scatters are mainly *Aneinanderpassungen*. In this setting the high density Site K, H and F assemblages can be interpreted as mainly *ad hoc* or 'expedient' technologies, focused on activities to be performed 'on the spot'. Locally procured raw materials were systematically reduced to large quantities of suitable blanks ('cutting equipment') for direct flake use or for minor tool production. These patches predominantly reflect maintenance of technology.

Raw material study and refitting suggested that the majority of the recovered Belvédère Unit IV tools *sensu stricto* are part of a transported toolkit. For example (convergent) scrapers, (unretouched) backed knives and Levallois products were extensively transported from one place to another, possibly in anticipation of future use (Roebroeks *et al*. 1992). The latter were mostly well prepared, though sometimes heavily reduced, were made from fine-grained raw materials and were discarded at 'some' distances from their place of production. Together with few well-prepared cores they must have been brought to locations where the tools were sometimes resharpened and core edges were sporadically renewed. These spatially scattered implements probably circulated for a longer period of time in a cultural system. The areas where only the transported items were used and discarded and where no major additional flint equipment was produced are represented by the Site G and N low density scatters, as well as by the isolated section or test pit finds. It can be suggested that these transported technologies were used in direct food procurement.

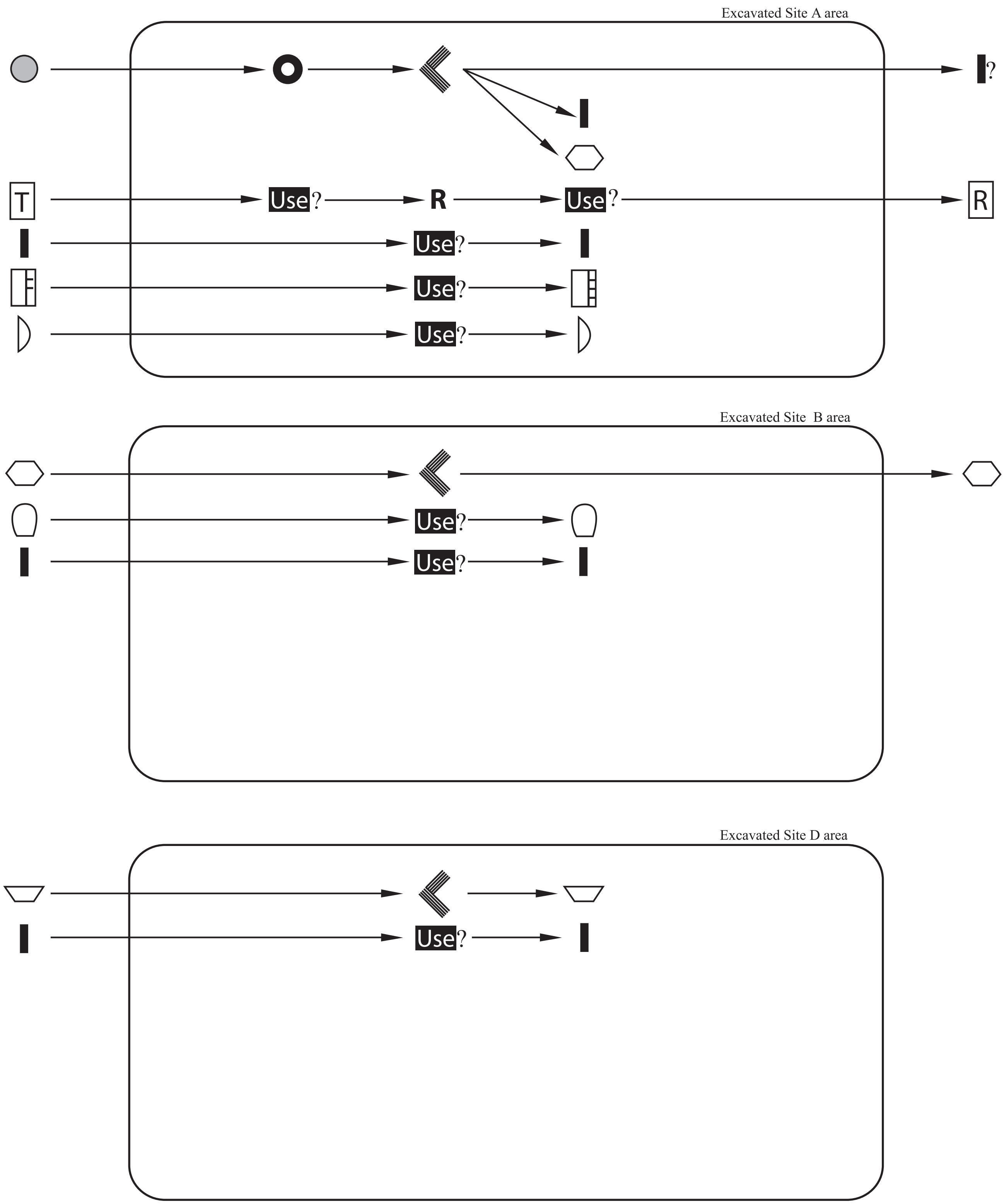
Although there is a similarity in density and (probably) main activity, the Belvédère high density patches differ regarding typology, technology and spatial distribution. This might suggest that two kinds of patches are present (Site C *versus* Sites F, H and K). The differences are mainly depending on the amount of transported material (flakes and cores). The Site C patch, where a transported technology (well-prepared cores) was brought to and from which expedient 'cutting implements' were produced for local and/or future use, can therefore be considerate as an in-between situation.

In general the Belvédère data indicate that we are actually dealing here with the remnants of 'binary strategy' (*cf*. Geneste 1985). It is however not a 'black and white' situation but more a matter of scale as all Belvédère scatters and patches contain some flaking activities; *i.e*. complete reduction sequences, from the procured raw material nodules to the discard of the produced flakes, cores and tools, at the high density patches Sites F, H and K, and the production of 'single' or small series of flakes and the rejuvenation of core edges at the low density scatters of Sites G and N. In addition all Belvédère locations show a certain amount of transported material, in the form of cores, flakes and/or tools. Percentage-wise there are more transported items at Sites C, G and N (see Figure 5.3 for a summary of lithic behaviour). In the patches these transported 'toolkits' were locally replenished or renewed with *ad hoc* procured and produced flint artefacts, to be used 'on the spot'. Moreover, the described 'binary pattern' indicates that the observed technological differences may have been mainly related to different aspects of Middle Palaeolithic mobility (Roebroeks *et al*. 1988*b*).

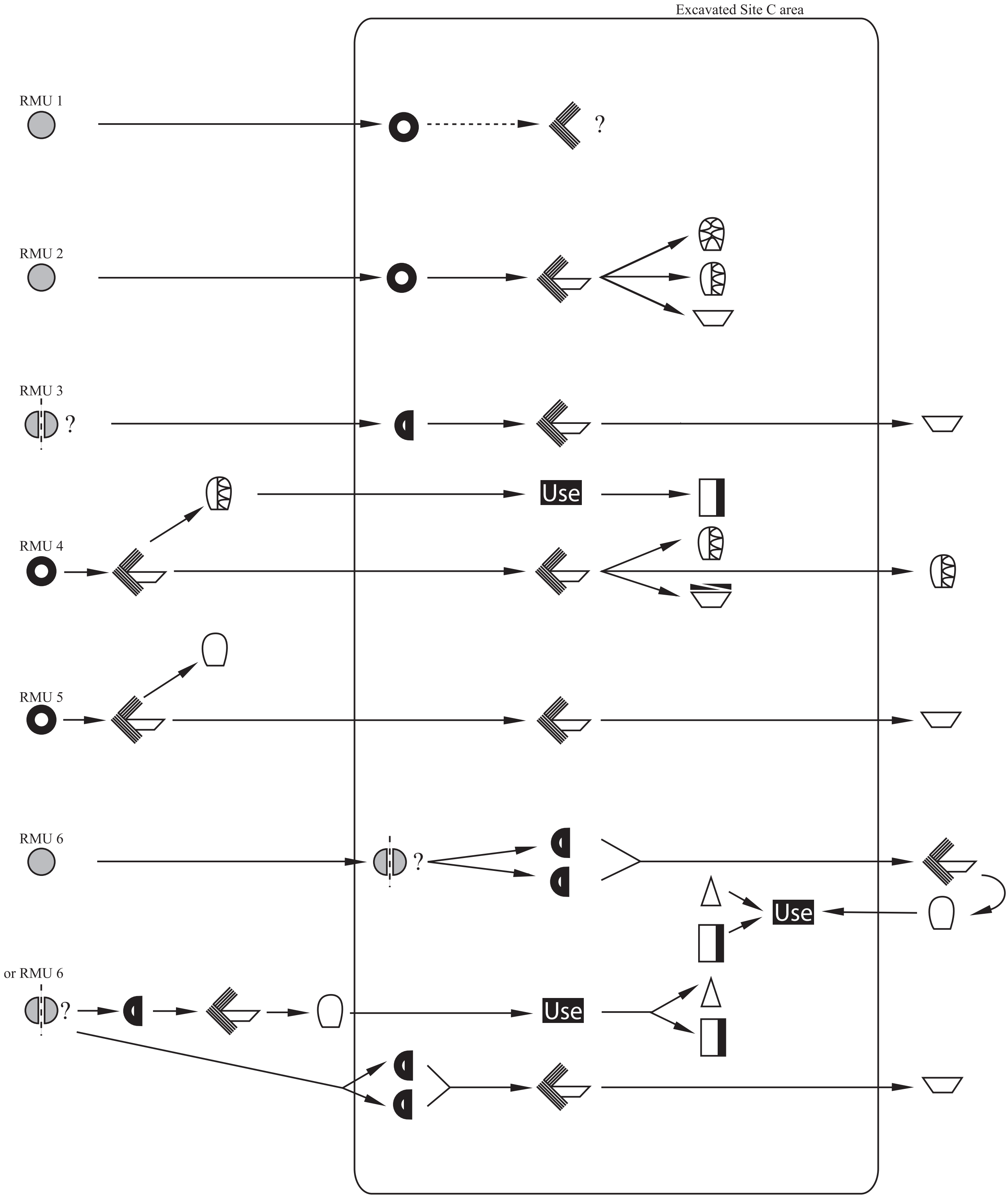
Although the high- and low-density distributions give different but complementary information, it has to mentioned again that they do not form separate and clearly defined spatial units; all Belvédère find distributions have a position somewhere on a sliding scale between the areas with the highest densities at Site K and the areas with lowest densities at Site N. It can therefore be concluded that all excavated areas produced remnants of a 'single' mobile strategy in which flint cores, blanks and finished tools were constantly produced, carried around and maintained in preparation of various activities. The scatters and patches probably represent different places in the spatial organization of Middle Palaeolithic equipment and the executed activities eventually resulted in a spatial fragmentation of various phases of the '*chaînes opératoires*' (*cf*. Roebroeks 1988:58-59).

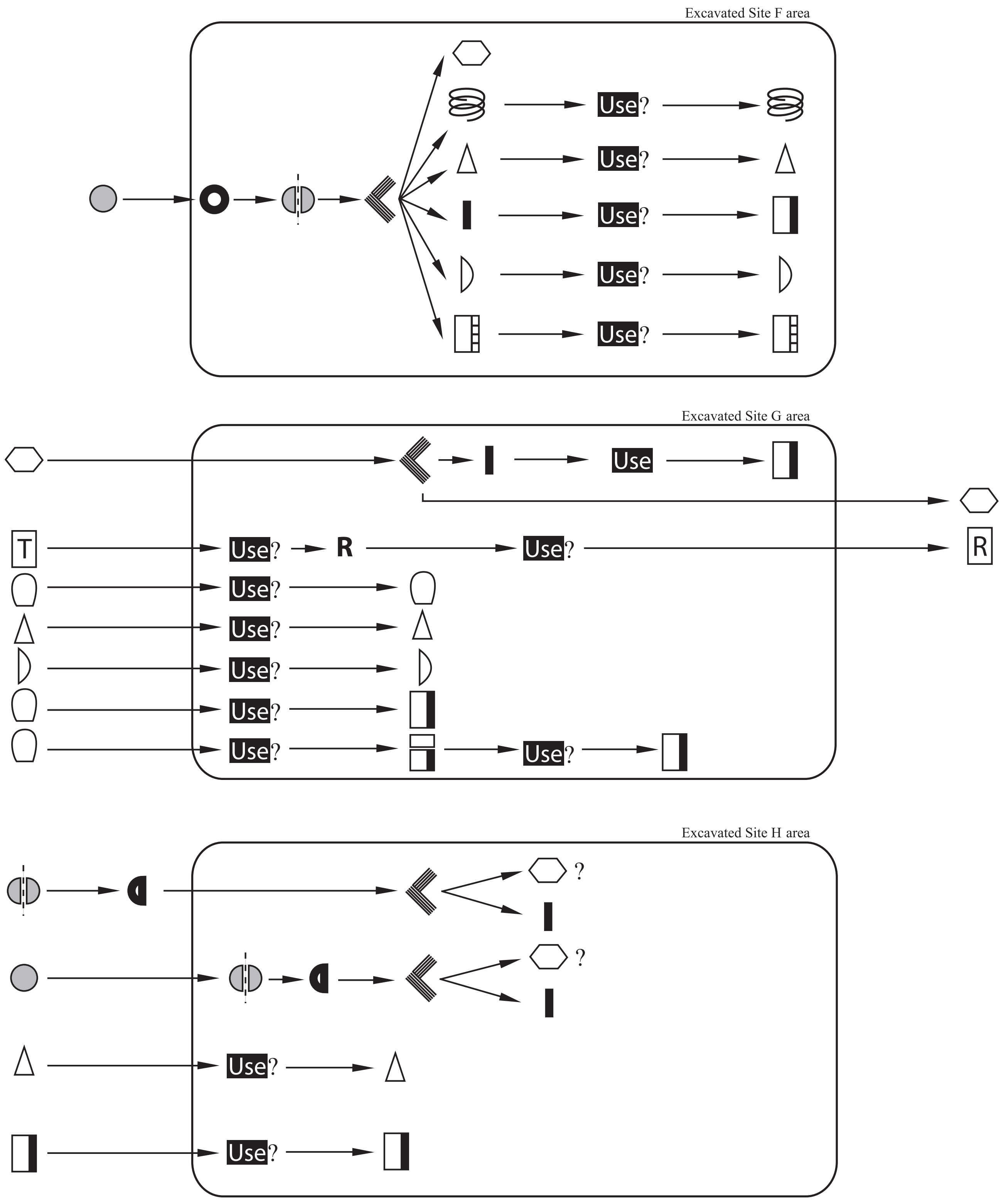
This introduces us to the next question. If the Maastricht-Belvédère (Unit IV) scatters and patches represent spatially different places where Middle Palaeolithic early humans organized, maintained and/or used their foraging equipment, which kind of activities/tasks might have been practised at the locale?

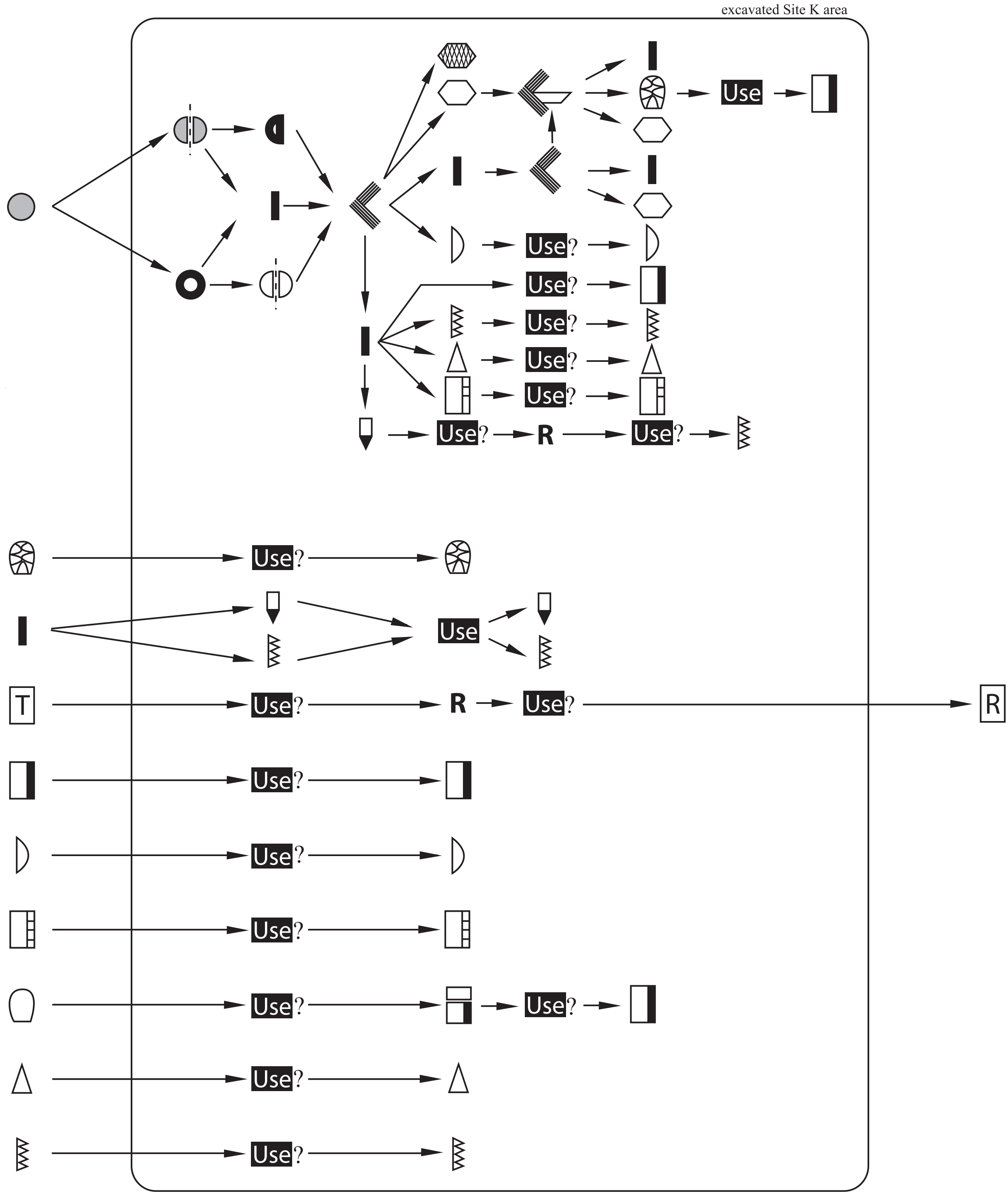
In our search for answers to this question, it is important to realize that the executed activities were probably not only technological in nature and that they possibly also involved materials other than flint. Organic artefacts like wood (*cf*. Lehringen [Thieme and Veil 1985] and Schöningen [Thieme and Maier 1995; Thieme 1996, 1997, 1999]), bone and/or antler (*cf*. Salzgitter-Lebenstedt [Tode 1953, 1982; Gaudzinski and Roebroeks 2000]) can be mentioned. Despite the fact that most of the recovered Unit IV faunal remains were poorly preserved, some clues can be found to the Belvédère situation. The co-occurrence of lithics and faunal remains and the information derived from use-wear analysis (van Gijn 1988, 1989; Roebroeks 1988; Roebroeks *et al*. 1997) are of specific interest for making inferences on local early human activities. As mentioned before (Roebroeks 1988:75-76; Chapter 4), the nature of Middle Pleistocene activities in this small part of the Meuse valley bottom may be best indicated at Maastricht-Belvédère Site G. There, a large backed knife with micro-wear traces recovered amongst a concentration of faunal remains pointed to the butchering of a rhinoceros. That the processing of animals was a main activity carried out in the 'veil of stones' is also supported by



Excavated Site A area
Use?
R
Use?
R
?
Use?
Use?
Use?
Excavated Site B area
Use?
Use?
Excavated Site D area
Use?


Excavated Site C area
RMU 1
?
RMU 2
RMU 3
?
Use
RMU 4
RMU 5
RMU 6
?
Use
or RMU 6
?
Use


Excavated Site F area
Use?
Use?
Use?
Use?
Use?
Excavated Site G area
Use
T
Use?
R
Use?
R
Use?
Use?
Use?
Use?
Use?
Use?
Excavated Site H area
?
?
Use?
Use?


excavated Site K area
Use
Use?
Use?
Use?
Use?
Use?
Use?
R
Use?
Use?
Use
Use?
R
Use?
R
Use?
Use?
Use?
Use?
Use?
Use?
Use?

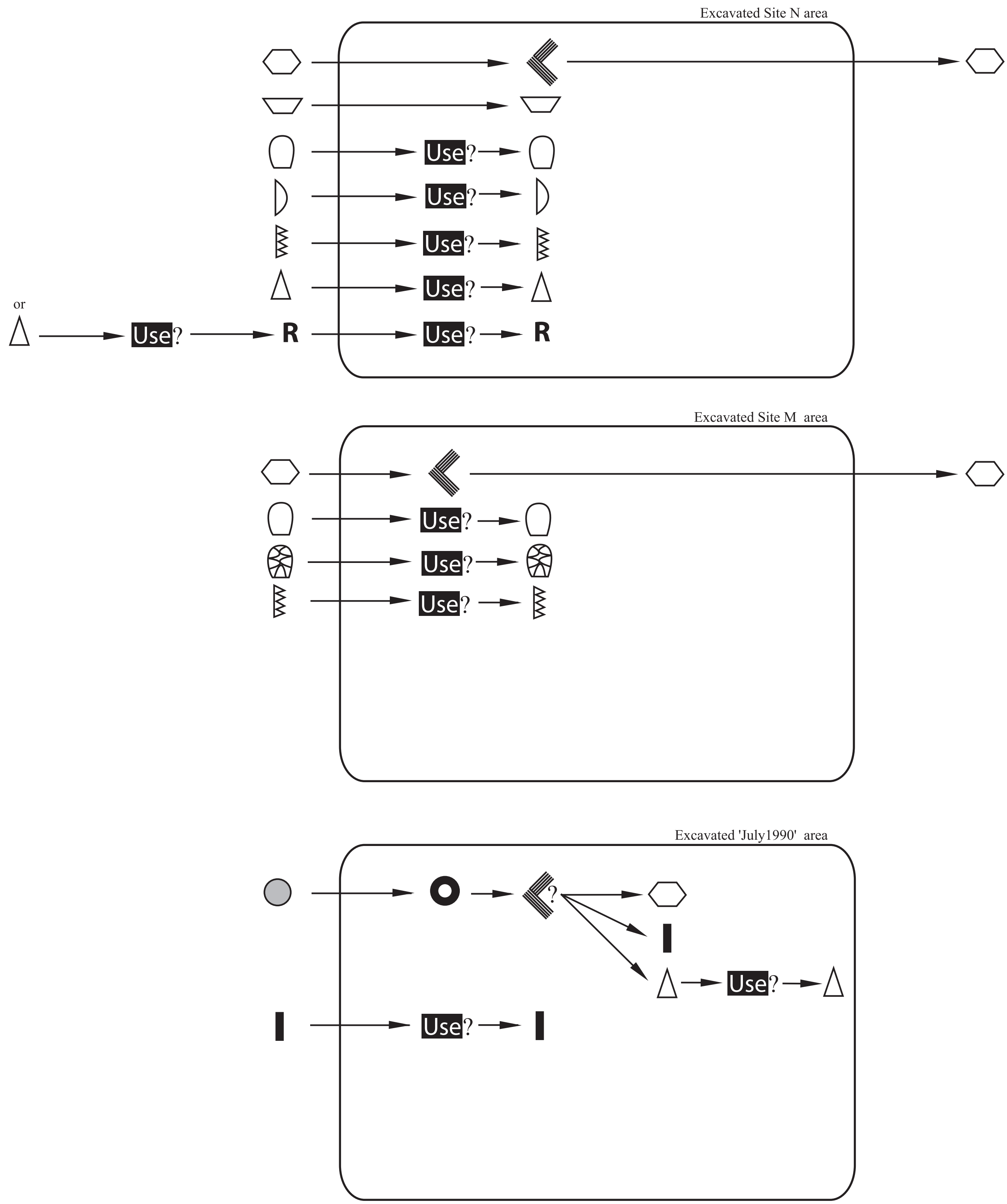

Excavated Site N area
Use?
Use?
Use?
Use?
or
Use?
R
Use?
R
Excavated Site M area
Use?
Use?
Use?
Excavated 'July1990' area
?
Use?
Use?

Figure 5.3: Maastricht-Belvédère. Schematic summary of lithic behaviour for the Unit IV sites.

the scarce micro-wear results of other Belvédère scatters (*cf.* Site C). These indicate the use of simple (unmodified) flake(s) (tools) for the cutting (procurement) of meat and the processing of hides (van Gijn 1988, 1989). The lithic analysis indicated that the principal flaking strategy was probably geared toward the production of long and wide flakes with large 'cutting edges'. The latter well-prepared and/or selected lithics seem to have been also a major component of the transported 'toolkits' (amongst others the backed knives, *cf.* Sites G, N and K). According to the use-wear results, these could be the implements that were most often used for meat processing.

It can therefore be concluded that a major part of the 'expedient' and/or 'curated' technologies was probably used in meat related activities, which appear to have been one of the major reasons for the human presence at the Belvédère locale. Whether the majority of faunal remains found inside the excavated areas owed their presence to early human activities, which at Site G probably was the case, or should be considered as 'background fauna' (Roebroeks 1988) and whether these activities were related to scavenging (Gamble 1986, 1987) or hunting (Binford 1985) are questions for which the data is insufficient or lacking at Belvédère. Nevertheless, the spectacular results of the excavations at Schöningen in Germany (Thieme and Maier 1995; Thieme 1996, 1997, 1999), *i.e.* the finds of several wooden javelins, clearly showed that early humans were technologically capable to hunt some 350,000 years ago.

It is clear that the lithic strategy applied at Belvédère reflects 'short term, episodic and highly mobile' (Roebroeks and Tuffreau 1999:128) spatial behaviour, suggesting only very brief visits to the riverine Meuse area. In addition, there are probably no indications for a longer and consistent use of one and the same location. In other words it seems that early humans did not operate out of a 'central place' or 'base-camp' for their 'daily' subsistence practices in the river valley. If there were such camps, they were probably not present or recognised at Belvédère.

One of the crucial questions in this discussion is how to archaeologically identify a 'base camp'. Several authors (amongst others Binford and Binford 1966; Isaac 1978*b*; Binford 1991) suggested that some physical structures (*cf.* Gamble 1986) and specific activities should be present and performed 'on the spot', *i.e.* activities involving technological maintenance, sharing, preparing and consumption of brought-in foods, production of tools and cores for future use at other places, social interactions involving mature and juvenile individuals, etc. It is however clear that some of these activities are virtually impossible to trace archaeologically.

The issue of organized *versus* compound entities is essential in a discussion on possible land-use models of Middle Pleistocene hunter-gather populations (*cf.* Binford 1987*a*). As suggested before (Roebroeks 1988), the majority of the well-preserved Belvédère findspots represent taphonomic enigmas, in which meaningful behavioural relationships between (groups of) artefacts could not be made. Most sites probably represent accumulations of materials (activities), formed during several independent depositional events spaced in time. A palimpsest scenario is most probably responsible for the low density scatters at Sites N and G but possibly also for the majority of the high density assemblages (Roebroeks 1988; Roebroeks *et al.* 1992).

For example at Site C the occurrence of burned artefacts provided, on the one hand, some indications for the chronological relationships of some of the flint-knapping activities. On the other hand these burned lithics, which could be refitted to particular nodules or cores, indicate a certain time-depth in the deposition of the artefacts (see Roebroeks 1988 for details).

In the context of this palimpsest debate, Site K seems to be an exception. Although burned artefacts could suggest some time differences of deposition, in view of typology, technology, refitting and intra-site spatial patterning one is more inclined to think that this patch was created during one single use phase of activity (Section 3.10.2). Additionally, this high density assemblage can be interpreted as a rather organized use of space. This of course does not immediately mean that we are dealing here with the remnants of a base-camp.

Generally it can be concluded that Maastricht-Belvédère shows no clear indications which could identify certain scatters, and especially patches, as base-camps, whatever that means in terms of lithic reflections. Even the Site K artefact distribution, where there are some 'signals' for an organized use of space, probably represents a 'brief' visit related to the maintenance of technology in combination with other activities like food procurement (*cf.* Binford's [1978] 'hunting' stands). As a result, it is possible to use the Belvédère Unit IV situation as an indication that early human groups did not operate out of central places. It has to be stressed again, however, that we are dealing here only with a very small part of a landscape (ca. 6 ha of a valley bottom location) and that we are probably missing evidence to answers such questions.

River valley bottom locations like Maastricht-Belvédère were probably of interest due to their raw material availability. Local flint supplies were relatively abundant in the gravel-beds of the river Meuse and available in the form of relatively large coarse-grained nodules which show many flaws (*cf.* Site K). Such locales also provided easy access to fresh water, were ecologically varied, rich in plant food and attracted different species of large mammals (van Kolfschoten and Roebroeks 1985; van Kolfschoten 1990; Vandenberghe *et al*. 1993 and van Kolfschoten *et al*. 1993), including early humans.

In general places like Maastricht-Belvédère could have functioned as Middle Palaeolithic 'shopping and/or chopping centres' where on a 'regular' basis food and raw materials were obtained for 'daily' early human subsistence. Lithic analysis and conjoining showed that well-prepared toolkits entered the Belvédère valley bottom location(s), where they may have been used for activities of short duration and directed primarily towards the procurement of meat (*cf*. Roebroeks 1988:75-76, for Belvédère-Site G). Furthermore, the Belvédère analysis could suggest that the procurement of flint had an 'embedded' character, *i.e*. was 'embedded' in the 'daily' movements and activities of Middle Palaeolithic groups (*cf*. Binford 1980). One can imagine that when these toolkits were not adequate enough for a certain activity, they were replenished, assisted or replaced by *ad hoc* produced 'cutting edges' on locally found flint (for example at Site K). By using different technological modes (Levallois *versus* Disc/discoidal), they were apparently capable of surmounting different types (fine- *versus* coarce-grained) or qualities (with flaws *versus* without fissures) of flint and could directly anticipate certain problems. Moreover, the incoming lithic implements (scrapers, large and well-prepared Levallois cores and flakes) could indicate a certain amount of planning-depth.

The 'veil' model (*cf*. Roebroeks *et al*. 1992) and Roebroeks (1988) indicated already that the Belvédère Unit IV 'scene', in which different find patterns occur, could have functioned as a 'fixed point' in a dynamic system of continuous transport of artefacts, *i.e*. prepared cores, finished flakes and tools.

Such a hypothesis is for example suggested for the Middle Palaeolithic levels at La Cotte de St. Brelade (Callow and Cornford 1986), Biache-Saint-Vaast (Tuffreau and Sommé 1988) and Seclin (Tuffreau *et al*. 1994). Analysis showed that these northwest European locations must have been visited 'briefly' on a frequent base and over longer periods of time. This resulted in the documentation of several find levels where one can see a consistent technological response to local raw material availability. It has been suggested that these locales were visited over and over again, thanks to prior knowledge of the raw materials, or better, the natural environmental situation (Roebroeks and Tuffreau 1999). Roebroeks and Tuffreau (1999:129) speak of "fixed points on the mental maps of Middle Palaeolithic foragers" which were visited intentionally, by means of well-planned trips. According to the time-depth of these multi-level locations, the information on particular points of interest must have been shared over several generations (Féblot-Augustins 1999; Roebroeks and Tuffreau 1999).

The question, whether the Belvédère locale (on its own) functioned as a 'fixed point', can probably be answered negatively. As the location represents only a very tiny part of a riverside landscape, one is more inclined to suggest that the complete river valley bottom, or at least part of it, could have functioned as a 'fixed point'. Early humans could have focused their 'daily' foraging trips on these waterside settings as they probably represent Palaeolithic 'shopping centres', for various reasons mentioned above. Moreover, "these open corridors through forested areas must have acted as a kind of highways for Pleistocene hunter-gatherers" (Roebroeks and Tuffreau 1999:127), who briefly stopped to execute a number of food and/or non-food related activities.

In conclusion, the main archaeological level at Maastricht-Belvédère, that is Unit IV, seems to indicate that the banks of the river Meuse were frequently visited by Middle Pleistocene early humans. These hunter-gatherers left behind a 'veil of stones' in the riverside landscape. In this landscape different kinds of artefact distributions were discarded during 'limited' periods of time. Although both high- and low-density patterns give different but complementary information concerning the aspects of artefact density, typology, technology, raw material, spatial distribution, and so on, it can be concluded that the Belvédère scatters and patches mainly reflect the 'intermediate' stages in the use-life of transported technologies. Brought-in 'toolkits' were replenished, assisted or replaced by locally produced implements and used during food (meat) processing activities. The technological variations (disc[oidal] *versus* Levallois) were probably for a large part related to the used (or availability of) raw materials. Technology can therefore be described as very flexible.

Although the 'continuous' archaeological find distribution (*i.e*. scatters and patches) was the centre of attention, it was realized that the information revealed could be one-sided and therefore representing only information on the valley bottom occupation, or better on the Belvédère situation. In Roebroeks' words:

> "Focusing our archaeological attention to the -usually better preserved- fine-grained 'sites' may eventually result in the construction of land-use models based on the -generally short-term-sites produced in areas with a high rate of sedimentation." (Roebroeks 1988:168).

Moreover, one should even ask the question whether the Belvédère data is representative for a valley bottom landscape, or at least the stream valley of the river Meuse. 'Long-term' research at amongst others Mesvin IV (Cahen and Haesaerts 1984; Cahen and Michel 1986) in Belgium, Biache-Saint-Vaast (Tuffreau 1978*a*, 1986; Tuffreau *et al*. 1977, 1982; Tuffreau and Sommé 1988) and Cagny (Tuffreau 1978*b*;

Tuffreau *et al*. 1986; Antoine and Tuffreau 1993; Tuffreau and Antoine 1995) in France and Salzgitter-Lebenstedt (Tode 1953, 1982; Busch and Schwabedissen 1991), Markkleeberg (Grahmann 1955; Baumann *et al*. 1983) and Wallertheim (Conard *et al*. 1995*a* and *b*; Adler and Conard 1997; Conard and Adler 1997) in Germany clearly shows that valley bottom occupations in other northwest European regions are characterized by 'different' technological outputs than Belvédère. On the one hand, this could indicate that different valley bottoms do reflect completely different behavioural, and therefore technological, patterns. The investigated ca. 6 hectares at Belvédère could, on the other hand, be seen as reflecting essentially only a fraction of a much broader technological strategy in (and around) the Meuse valley bottom. If the latter is correct, than only the relics of highly mobile behaviour were excavated.

Given the spatially continuous character of activities of hunter-gatherers, it can be assumed that the identified Middle Palaeolithic find occurrences (campsites) were associated with other sites in both similar and other geomorphic zones, representing similar or complementary components of former settlement-subsistence systems. The information potential of the scatters and patches in the Meuse valley discovered at Belvédère may therefore be more fully realized when they are compared to Middle Palaeolithic find occurrences in nearby regions. To create a picture as accurately as possible, future research should be shifted to a more (micro-)regional scale. Consequently, find occurrences in the higher landscapes outside the river valley (*cf*. plateaus and plateau edges), mostly surface scatters, should be compared to the Belvédère Unit IV archaeological situation. According to some preliminary typo-/technological studies (see amongst others Kolen *et al*. 1998, 1999 and Verpoorte *et al*. 2002) the artefact occurrences in the higher parts of the Southern Limburg landscape do indeed seem to contain information that is complementary (different) to the valley bottom 'scatters and patches'. Such variations have also been described for other regions, such as the Belgian Meuse area (Ulrix-Closset 1975) and the stream valley area of the river Ruhr (Schol 1973, 1974, 1979).

Finally, it should be stressed (again) that the Belvédère archaeology, on the one hand, only represents Middle Palaeolithic activity remains of a very specific segment of the total settlement system and that they may not be representative for the (Meuse) valley bottom in general. In fact, they cover only a small unit in time and space and often show taphonomic enigmas. On the other hand, surface scatters in the 'higher' landscapes usually have been treated as "the Cinderella of Palaeolithic archaeology: they were commonly viewed as inextricable palimpsests, as extremely 'coarse-grained' assemblages formed by many unrelated events - widely spaced in time, and as 'container sites' of low cultural integrity." (Kolen *et al*. 1999:187). The latter may, however, be too pessimistic as Middle Palaeolithic surface scatters can be informative (Kolen *et al*. 1998, 1999) and are sometimes even our only information on patterns of early human land use outside the valley bottom locations. Integrating both types of data (*i.e*., from surface scatters and from 'buried' land surfaces) into testable models of Palaeolithic usage of landscapes should become an important avenue in future studies of early hominids.

notes

1 'Exotic' has to be read here as 'not belonging to' the Rijckholt/Valkenburg group.