Emergence of modern human behaviour: what can Middle Stone Age lithic technologies tell us?

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Abstract

This paper discusses evidence for modern human behaviour during the Middle Stone Age (MSA) period. Lithic technologies from five MSA Kenyan sites have been used in a descriptive and analytical investigation involving three major steps. First, artefacts were sampled from previously excavated assemblages. Secondly, morphological and metrical data were collected from each artefact using a number of variables. Third, the data gathered were statistically organised, computed and interpreted based on current debates and anthropological theories. The results show a marked variation in MSA assemblages caused by a number of factors, including environmental conditions, resource availability and type, and the hominid choice of different reduction techniques and strategies. Results also show that technological patterns reflect early stages of modern human behaviour and that there is little standardised technological practice within the assemblages. Overall, the results show that MSA technology contains significant evidence for modern human behaviour reflected in raw material procurement, exchange patterns, adaptive behaviour and mastery of craftsmanship through repetition and learning. The basic argument of this paper, therefore, is that modern human behaviour evolved over time and is manifest in developmental stages during the MSA across several sites and assemblages in East Africa.

Introduction

Middle Stone Age (MSA) lithic assemblages in East Africa document activities of the technological process, which contain the social behaviour of humans, and can be used to understand the development of cultural modernity. One major advantage of this pool of behavioural reservoir is the almost excellent preservation of evidence at various sites dating to middle to late Pleistocene period. The state of the sites in which materials are found, and the nature of the materials themselves, fundamentally influences the way lithic remains are studied, organized and interpreted. Materials showing distinct technological patterns, for example, the production of blades and/or microliths, may be perceived as signals for modern behaviour, where as less patterning may be seen as reflecting archaic behaviour.

Lithic studies have been used often to trace the beginnings of cultural modernity. Focus on specific traits, such as standardisation, imposed style and high artefact turnover, however, may lessen the ability to identify other processes or activities that form behavioural patterns that may reflect cultural modernity. Also, approaches that seek to find specific traits and compare them with those of later periods,

as has been the case, may be methodologically bias in dealing with data from MSA contexts where some of the traits may not be too obvious.

Approaches that are capable of utilising technological processes and patterns presented by the lithic assemblages may offer a more flexible and holistic means of identifying signs of modern behaviour. In this paper, I present the use of a "technological systems" approach that may offer an elaborate means of studying lithic artefacts in various MSA sites and pick patterns that point toward cultural modernity. First, I will define what I mean by modern human behaviour and lithic technologies and introduce the nature of data used to draw technological patterns indicating various forms of behaviour during the MSA period. Second, I will present technological activities from the Central Rift Valley, Kenya that demonstrates the presence of modern behaviour during this period.

There is no standard or agreed definition of modern human behaviour. Researchers use the term fluidly by invoking different traits to assess the presence or absence of modernity in the archaeological record. The definition, therefore, presents a challenge, which may take some time to settle. I define modern human behaviour as behaviour characterised by the ability to plan ahead and execute those plans in a group context, innovate technologically, establish social and trade links, adapt to changing conditions and environments, and to create art and use other forms of symbolism, which is a reflection of abstract thinking.

These traits signify cultural modernity and may be identified in the archaeological record in various forms and quantities. Lithic analysis requires a holistic approach and/or use of proxy data/evidence for some of these traits to be identified. In this paper, I use the "technological systems" approach as a method of identifying traits that reflect cultural modernity.

I define lithic technology as the whole process of manufacturing and use of tools from stone. It includes raw material procurement processes, the actual manufacturing procedures, implements produced, the social and economic needs met or to be met by such implements and the way each material is used and discarded. Lithic technology comprises all these processes through which a series of behaviour-driven activities create objects that are desired by a group.

The "technological systems" approach

Most processes that define lithic technology form or are components of subsystems which are parts of a larger technological system and function parallel or in a series with others to realise the desired outcome of producing artefacts for use. In this paper, I have identified five main subsystems that include:

(i) environment; (ii) manufacturing process; (iii) implements; (iv) technological needs and (v) use and discard (Figure 1). Each of these subsystems may contain a series of constraints that control the input and output within the technological system. Activities are controlled by human behaviour, which acts as a moderating machine while at the same time evolves leading to new behavioural patterns reflecting new levels of cognitive ability.

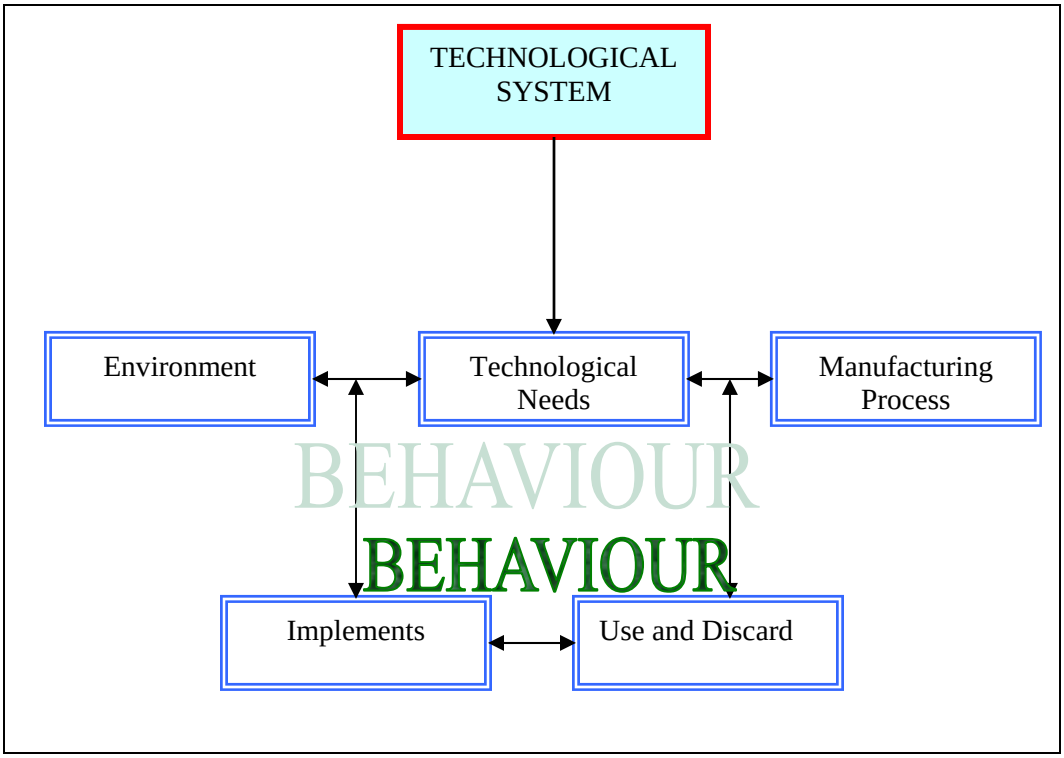

Figure 1: Model of a technological system within which behaviour influences activities, and in turn evolves to higher levels of cognition.

The patterns I present in this paper are from MSA sites in the Central Rift Valley, Kenya and the adjacent regions (Lake Victoria Basin, south-eastern Kenya and northern Tanzania). Previously excavated materials (cores, flake debitage and selected shaped tools) from five MSA sites (Prospect Farm, Enkapune Ya Muto, Prolonged Drift, Cartwright's Farm and Muguruk) reveal a record of behaviour embedded in the technological system dating to more than 100,000 years BP. In 2004, I conducted an attribute analysis of over 3,200 cores, flake debitage and shaped tools from these assemblages. I analysed 470 cores and core fragments, 1,118 whole flakes and 538 shaped tools to reconstruct reduction strategies and establish technological patterns.

When looked at in the overall, the various MSA assemblages reflect (i) use of different rock types as raw material, which include both local and exotic ones; (ii) diversity of artefact types, at least by using the simple method of artefact category counts; (iii) use of prepared cores (Levallois and radial discoidal techniques) to produce uniform flakes as well as use of non-prepared core techniques using bipolar methods; (iv) production of triangular flakes most of which have been used to make convergent scrapers and points and (v) minimal blade technology with backing of blade forms and microliths.

Detailed examination of the assemblages reflects various forms of innovation within the technological system. Activities within the technological subsystems are especially useful in identifying indicators of modern behaviour. An examination of these activities suggests that not only is modern human behaviour visible/identifiable in various processes, but there is also a rising similarity in behaviour with later hunter-gatherer societies.

Indicators of modern behaviour

Within the environmental subsystem, four trends (traits) symbolise modern behaviour. These are (i) planning, (ii) social and trade networks, (iii) Curation of artefacts and (iv) use of exotic materials.

These traits may be inferred from the "obsidian networks" both within the Central Rift Valley and the wider East African region, especially the Lake Victoria Basin, south-eastern Kenya and northern Tanzania. The long distances obsidian was transported (**Table 1**) imply deliberate and planned activities, which may have involved exchange between groups occupying different regions. In such a scenario methods like down-the-line trade networks where objects were passed from hand to hand through different groups of people may have been established and therefore brings to mind the nature of social networks similar to what is common in Later Stone Age cultures.

In the manufacturing subsystem, indicators of modern behaviour include standardised technological procedures, for example, the use of similar reduction techniques (Levallois and radial discoidal), selective use of both local and exotic raw materials and use of various rock types (obsidian, other volcanics such as basalt, quarts, quartzite, chert etc). Manufacturing process also indicates alternate use of formal and informal reduction strategies, which may reflect the involvement of more people and the use of learning processes in the manufacturing.

Site	Obsidian Sources								
	Njorowa Gorge	Upper Eburru	Highland	Kedong	Sonanchi	Oserian #2	Kinangop	Cedar Hill	Masai Gorge
Prospect Farm	**40**	**15**			**30**	**40**		**10**	**15**
Muguruk	**190**	**185**							
Prolonged Drift	**50**	**33**			**40**				**30**
Lukenya Hill	**105**	**130**	**6**	**65**	**125**	**115**	**125**	**135**	**135**
Nasera		**240**			**230**				**240**
Mumba Hole	**305**								

Table 1: Obsidian sources and distances (in Kilometers) raw materials were moved to sites within the Central Rift Valley, southern Kenya, Lake Victoria Basin, and northern Tanzania (Merrick and Brown 1994).

Implements subsystem, with diverse categories, suggests that MSA populations carried out multiple activities. Each implement probably performed a distinct function fulfilling the technological needs such as food acquisition, trade, and exchange amongst others. Both implements and technological needs subsystems also imply a possible exploitation of varied environments. The ecotonal position of some of the sites as indicated in **Figure 2** is in tandem with the exploitation of different environments. This implies knowledge of resource seasonality and organisation of mobility within the resource areas in a logistical manner similar to modern hunter-gatherer societies.

Implements subsystem also shows an emerging trend of standardisation shown by the shapes (**Figure 3**) and sizes of convergent scrapers and points. Comparison of mean values (**Table 2**) for various measurements shows that there is little variation across sites in the region in terms of how these artefacts were made.

Use and discard subsystem indicates that tools were used, re-sharpened, and at times, rejuvenated or changed into different forms. These curational procedures suggest that MSA populations treated their tool kit in similar ways as modern hunter-gatherer societies. Tool re-sharpening flakes and new (fresh) flake scars on old scars, at times covering large portions of a tool's edge indicate tool maintainability that reflects cultural modernity.

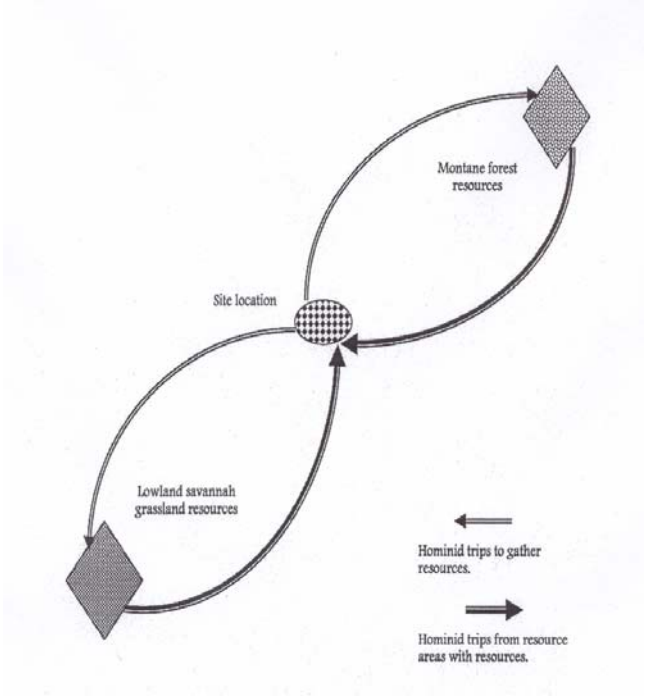

Figure 2: Ecotonal settlement model for MSA settlement location in the Central Rift Valley, Kenya. After Isaac 1972, and discussed in Onjala 2006.

Convergent scraper Unifacial point Bifacial point

Figure 3: Example of emerging standardization in shape of Unifacial and bifacial points, as well as convergent scrapers.

Variable	Convergent scrapers (Mean)			Unifacial points (Mean)		
	PF	EYM	CF	PF	EYM	CF
Length	34.4	28.8	35.4	38.3	32.2	35.2
Width/Breadth	24.4	19.3	24.1	26.4	17.6	22.7
Thickness	9.4	7.9	9.8	9.2	7.3	9.5
Ratio B/L	0.74	0.69	0.69	0.67	0.56	0.65
Ratio T/B	0.39	0.42	0.40	0.36	0.42	0.42
Ratio T/L	0.29	0.29	0.28	0.24	0.23	0.27

Table 2: Comparison of convergent scrapers and unifacial points mean values for metric measurements and ratios from Prospect Farm (PF), Enkapune Ya Muto (EYM) and Cartwright's Farm (CF).

Conclusion

Based on the patterns emerging from the technological system, it can be argued that MSA populations in East Africa, and elsewhere, had entered the threshold of modern human behaviour. Proxy data and available evidence indicate that planning, establishment of social links, and exchange networks as well as the use of exotic materials, which characterise modern behaviour, are present at the various localities occupied during this period. Other forms of evidence indicating cultural modernity include: curation of tools, exploitation of different environments, diversification of raw material use and the emerging standardisation of both process and artefacts produced.

The crux of this argument lies with the systems approach taken in lithic analysis. Not only is the method suitable for investigating behaviour, but it is also capable of sidestepping limitations of proving whether or not lithic artefacts contain imposed style or are standardised, elements that may vary between analysts, and is wholly the creation of modern researchers. Lithic analysis in this broad sense allows for the identification of a series of activities, and possible interactions between groups of people, and how they related to their environments. This may in turn reflect clear patterns indicating the level of cognitive ability. As patterns indicate for the MSA lithic technologies in the Central Rift Valley and Lake Victoria Basin, modern human behaviour has a long antiquity and went through a steady and gradual development through time.

Reference

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