

Bunuh 2010 site

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Abstract

Flake tool is one of the stone tools used by Paleolithic society which used stone as their technology. It is produced by flaking the core to get the flake. The flake that been used is known as flake tools. Flake tools found in Southeast Asia is said to be amorphous, which does not have a specific shape that can describe its function. So, this made it difficult for the typology classification of flake tool. However, many Paleolithic open sites have been classified based on flake tool morphology and technology, but the extent to which it represents the function has an issue. Therefore, usewear analysis was made using a flake tool from Bukit Bunuh's site, which is Bukit Bunuh 2010. Bukit Bunuh was a meteorite impact area then it has been the source rocks suitable to be used as a tool by the Paleolithic society. In advance, the study was conducted by classifying flake tool typology according to morphological and technological. The results of this classification showed that there are four typologies identified as serrated, notched, pointed and retouched. Serrated can be divided into concave, convex and straight. While the notched been divided according to the number of notches. Retouched typology can be divided based on their edge trimming that is, alternate, alternating, direct, bifacial and inverse. Only pointed typology does not have subdivision. After the classification, the observation of the usewear of the flake tools had been done. As a result of these observations, there are several functions of the flake tools such as sawing, slicing, whittling, drilling, scratch and multiple functions. Almost all the flake tools were used for whittle except pointed and retouched type bifacial. Meanwhile, the serrated flake tools with type edge of convex, straight and retouched flake tools with type edge of direct has been widely used for a variety of activities compared with the other types of flake tools. So, this analysis indicated that most of flake tool used for various activities and also for specific functions. This shows that Paleolithic societies produced economic and multifunctional flake tools.

Keywords: *Flake tools; Paleolithic; Usewear; Technology; Classification; Typology*

1. Introduction

Bukit Bunuh 2010 is a Paleolithic open site and has a function as a stone tools workshop. The site produced stone tools and knapping tools that is still *in-situ* and stone tool called flake tool is one of the most widely discovered in Bukit Bunuh 2010's sites other than pebbles tool. Flake tools from Bukit Bunuh 2010 resulting from flake removed from the core or from process to make pebble tools (Nor Khairunisa, 2013). It can be distinguished between flaking due to man action or broken naturally based on characteristics such as the presence of the bulb of percussion, ripples and fissures (Andrefsky, 2005, 2009, 1994; Dibble & Pelcin, 1995; Keeley, 1974, 1980; Semenov, 1964; Anderson, 1980).

Most of flake tools discovered were in small size. According to some researchers, flake tools in Southeast Asia is an amorphous (Reynolds, 1990; White & Gorman, 2004) which do not has the morphology or shape that can be associated with a particular function (Pawlik, 2009, 2004a, 2004b; Patole-Edoumba, 2009; Haidle & Pawlik, 2009).

In fact, according to Keeley (1980), different stone tools likely to be used for the same function. Besides that, western researchers also have named the flake tools as a scraper based on its functions (Cahen & Van Noten, 1971; Anderson, 1980; Dibble, 1987; Grace, 1989, 1990; Debenath & Dibble, 1994; Levi Sala, 1996; Brumm & McLaren, 2010). However, flake tools which were known as a scraper can also be divided according to its morphology (Dibble 1987; Debenath & Dibble, 1994). Due to this typological problem, Pawlik (2011; 2009) has proposed to use its function as one of the way to classify flake tools. Meanwhile, Zuraina (1996; 1998) classified flake tools according to the morphology and technology attribute. Thus, to what extent the classification by morphological and technology approach can describe the function of flake tools?

1.1 Objectives

This study has four main objectives namely,

- a. To build a classification for flake tools.
- b. To determine the functions of flake tools.
- c. To determine the relationship between classifications of flake tools with its functions.
- d. To determine whether a classification based on morphology and technology can be applied or not to the classification of the flake tools in Southeast Asia.

2. Methodology

To achieve these four objectives, the first step is to build a classification of flake tools. Classification was done according to flake tools technology and morphological attributes which followed the classification used by Zuraina (1996; 1998) on the Kota Tampan's site. An observation on the morphology and typology is important in the process of classification flake tools (Andrefsky, 2009; Debenath & Dibble, 1994; Newcomer, 1975). Classification according to the technology and morphological attributes is done by dividing flake tools into several technologies for instance notch, pointed, serrated and retouch (Figure 1).

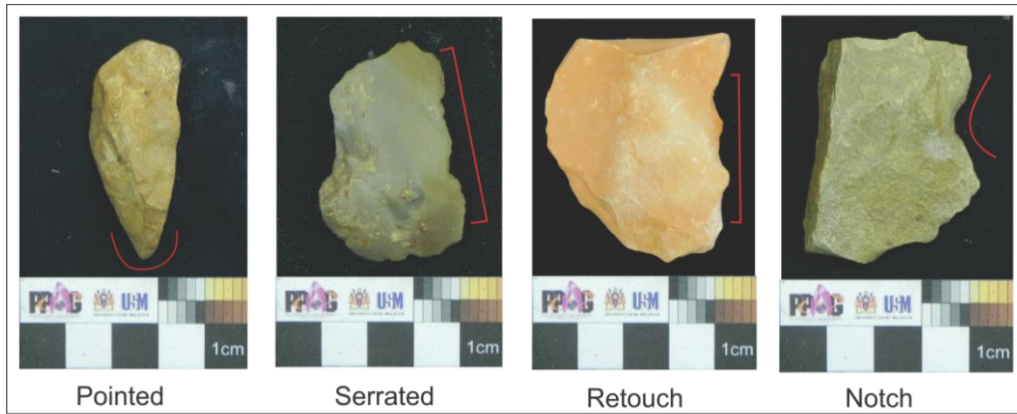


Figure 1: Different type of flake tools technologies at Bukit Bunuh site 2010

Each type of flake tools is divided into the subtypes of flake serrated tool. Then, it is divided into three different types according to the edge morphology which are convex, concave and straight (Figure 2). While the flake tool type retouch was divided into several subtypes based on the retouched technology which are direct, inverse, alternate, bifacial, and alternating (Figure 3).

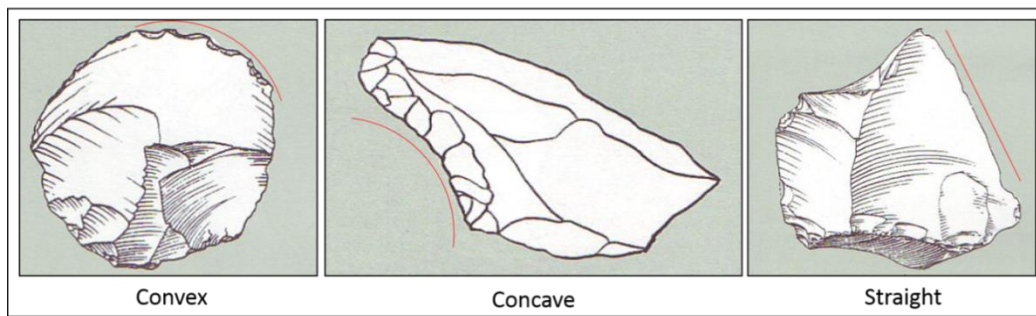


Figure 2: Morphological type of serrated flake tools (Source: Andrefsky, 2005)

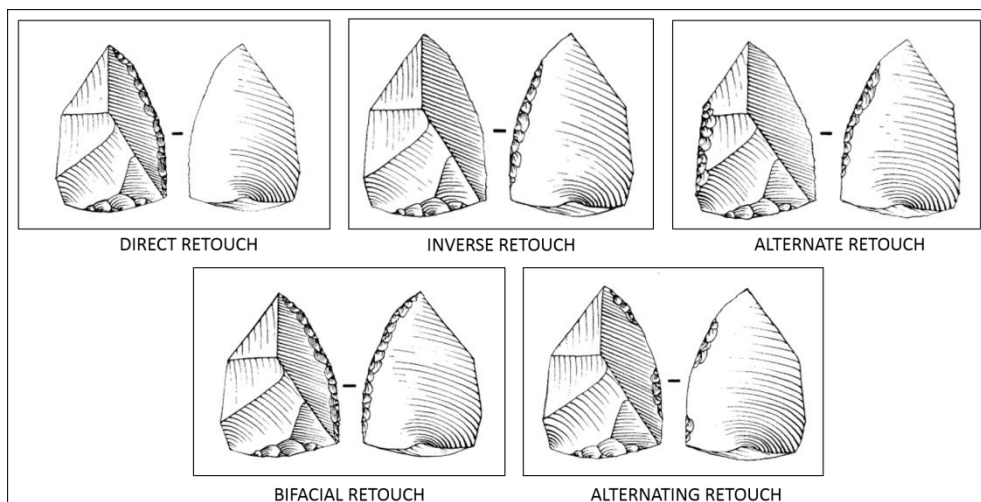


Figure 3: Morphological type of retouch flake tools (Source: Andrefsky, 2005)

For identifying the functions of flake tools, usewear experiment was performed on flake stone to identify the usewear attributes produced according to different activities of work. Examples of usewear attributes produced are horizontal, vertical and circle.

Horizontal movement consists of sawing, slicing and grooving activities. Meanwhile, the vertical movement involves sharpening and circle motion which representing drilling activities.

Different movement of work will produce different attributes at different edge that have been used. The attributes which may be observed are striation type, linear, gloss, polish distribution and rounding. Therefore, the usewear attributes resulting from different movement of works is used to identify types of work which produced at the edge of flake tools.

The most important attribute is the polished orientation. Perpendicular or parallel to the edge tool polished distribution is leading to the proper function of flake tools (Mahler, 1979: 314). Semenov (1964) explains the effect that shown vertical or perpendicular polished to the edge shows motion of sharpening or scraping. While parallel polished to the edge shows activity of sawing or slicing. In addition, different activities generate different growth of polished and how frequent it was used will also affect the polished development if the tool was used on the same working media (Grace, 2012; Keeley, 1980: 53-56). Therefore, in order to achieve the objectives of this study, 308 flake tools from Bukit Bunuh 2010 were used. All of these flake tools are the tools which obviously have an impact applied to their edge.

3. Result and Discussion

The results of flake tool classification based on morphology and technologies have divided the type of flake tool into serrated, pointed, notch and retouch. Serrated flake tool is 33%, retouch flake tool is 48%, notched flake tool is 12% and pointed flake tool is 7% (Figure 4).

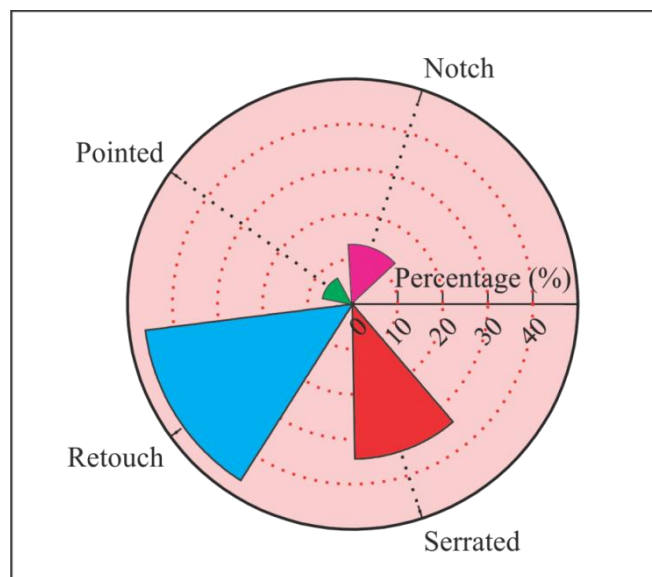


Figure 4: The classification is divided into notch, serrated, retouch and pointed flake tool.

Flake tools from Bukit Bunuh 2010 have shown that the type of retouch flake tool is the most widely used compared to other types of flake tools. Then, it is followed by

serrated flake tool. Meanwhile, pointed and notched flake tool are the least flake tools used during this era. Why do people in Paleolithic era at site Bukit Bunuh 2010 build more serrated and retouched flake tools compared to other flake tools? Is it related to the functions of the flake tools?

From the research, it has been found that the serrated flake tool with straight type morphology is the most dominant and produced by 51%. This type of edge is most likely being selected and used for working activities by prehistoric people. So obviously it shows that people during this era do selection to find most suitable edge type to be used based on working activities. Furthermore, from the research it shows that among all retouched flake tools typologies, direct type of edge trimming has the highest value which is 56% (Table 1). So, the direct retouch type is the most widely produced by Paleolithic society in Bukit Bunuh compared to other types of retouch flake tool. The question is what is the relationship between morphology and edge trimming with the function of flake tool? Why are certain flake tool produced? Does it have to do with the function of flake tool?

Table 1: Percentage and quantity according to morphology and typology of flake tool

Technology	Typology	Percentage	Percentage
Serrated	Concave	15	33
	Straight	51	
	Convex	28	
	Mix	6	
Notch	1 Notch	70	12
	2 Notch	22	
	3 Notch	3	
	4 Notch	5	
Pointed	Pointed	100	7
Retouch	Alternate	8	48
	Alternating	11	
	Bifacial	2	
	Direct	56	
	Inverse	22	

Usewear analysis has been carried out to see the relationship between flake tools with its functions. From the analysis it has been found that the flake tools in Bukit Bunuh are widely used for scraping activities (28%), sawing (23%), and multi-function (25%) (Figure 5).

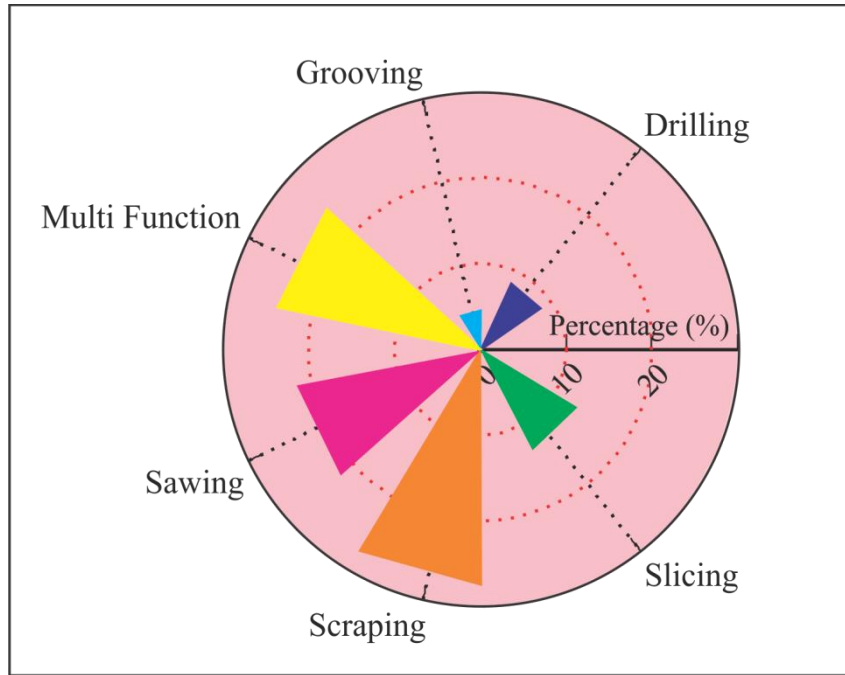


Figure 5: Percentage of overall function for flake tools based on usewear analysis.

From the result, it shows that serrated flake tool is widely used for scraping activity which is 45% from overall percentage for serrated flake tool based on its function. Then, it is followed by multi functions with 26% (Table 2). If viewed from morphology edge side, it indicates that straight edge type has been chosen by the community of Bukit Bunuh as a tool to scrap which is 19% out of overall percentage of serrated flake tool (Table 2). According to Lerner (2007) and Dibble (1995), flake tool typically used for scraping or sharpening, therefore the straight edge flake tools is most probably used for scraping skins and sharpening wood. Even ethnographic studies on the population in southern Ethiopia revealed that the majority of people use flake tool for hide scraping (Brandt, 1996; Brandt *et al.* 1996; Brandt and Weedman, 1997).

Based on the research done, it shows generally retouch flake tools were widely used for sawing (40%) and for multi functional (35%). Furthermore, direct edge type is widely used for sawing which is 22% and for mutli-function with 20%. Detail as tabulated in Table 2.

Table 2: The percentage and quantity of flake tools based on their functions and typology

Typology		Grooving (%)	Sawing (%)	Slicing (%)	Scraping (%)	Drilling (%)	Multi Function (%)
Serrated	Concave		1		13		1
	Straight	2	9	9	19		13
	Convex	1	1	7	13		6
	Mix						6
	Subtotal	3	11	16	45		26
Notch	1 Notch				70		

	2 Notch				22		
	3 Notch				3		
	4 Notch				5		
	Subtotal				100		
Pointed	Pointed	5				95	
Retouch	Alternate	1	3				5
	Alternating	1	6	1			3
	Bifacial						2
	Direct	5	22	7	2		20
	Inverse	3	9	5			5
	Subtotal	10	40	13	2		35
Total	Sub Total	6	23	11	28	7	25

Therefore, the results show that the two types of flake tools which are retouch and serrated flake tool is used for different functions. Serrated flake tool is used for scraping while retouch flake tool is widely used for sawing. Then it is possible that the existences of these two types of flake tools are related to their different functions. Although the main function of retouched flake tool is sawing but according to Clarkson *et al.*, (2015), retouched flake tool are caused by refinements again after the edges of the flake tools were blunt. Therefore, there is a possibility that the original flake tool is serrated but then were sharpened to become retouched flake tools and used for other functions. Therefore, retouch tool that have a usewear attribute that shown as a multi-function (Clarkson *et al.*, 2015; Shott & Sillitoe, 2005).

Meanwhile, both pointed and notched flake tool have less function compared to other types of flake tools. Pointed flake tool were widely used for drilling activities in which accounted for 95%. While, notched flake tool is 100% used for scraping. Therefore, both of these tools were produced in small quantity due to their limited functions. On the other hand, serrated and retouched flake tools were produced in large amount as they not only can be used for sawing and scraping, but also works multi functions. This shows that during the Paleolithic era there are flake tools which are economical and multi-function.

4. Conclusion

In conclusion, the results of this study show that flake tool can be classified according to the morphology and technology which are serrated, retouched, pointed and notched. Although this classification does not show their function but they represent different type of functions. For example serrated flake tool widely used to scrape while retouched flake tool used for sawing. Furthermore, both of them also can be used for multi-function jobs. So, both serrated and retouched flake tools have high percentage of production compared to the notched and pointed flake tools which can only be used for specific work. In fact, both types of these flake tools have morphology that can describe the function or purpose. On the other hand, the situation is different with serrated and

retouched flake tools where they do not have a specific shape that can be associated with their specific functions. Therefore, without clear shape or amorphous in serrated and retouched flake tools, they also can be used for multi-function.

Therefore, the flake tool in Southeast Asia which was amorphous indicates that Paleolithic people have the knowledge to produce a multi-function and economically flake tools. This is because the most important characteristic is the edge of flake tools not their shape.

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