

Flake Analysis

Rather than burden all of those interested in flake analysis with long cumbersome attribute lists at this time I would like to call attention to some of the problems of flake interpretation whether made by the aboriginal or the experimenter. It is doubtful and highly improbable that all ^{aboriginal} techniques of flake and blade making will be fully understood. We will however as the science of archaeology progresses in time and space be able to start associating ^{or even be identified} certain features and characteristics ^{some found and degree of skill} that are common to certain extinct social groups. It is not to say that there is ^{an} any direct connection between these peoples and that the techniques used to produce them, ^{indicative of either parallel or the same techniques} may be parallels using diverse approaches to obtain results that are similar. Many qualities are to be considered.

^{PP} MATERIAL
One must become aware of the vast differences in materials, for example, volcanic glass has the geological name of Obsidian, yet as a lithic material and flaking qualities ^{it has} have wide variations. Differences in mineral constituents, ^{the} Geological ^{differences in} formations, age, impurities, inherent stresses and strains, elastic qualities, temperatures of solidification and the size of the available material can and will influence the end product ^{Compound multiple flaked} whether it be for flakes, blades or implements. Silicious rocks ^{like Flint, Chert and Obsidian} are even more highly variable and the worker must either modify or develop techniques that will conform with the material. ^{Basalts & obsidian - quartzite & opal}

Flake character can be influenced by the fabricators used to perform a specific technique or techniques, often it is said that a billet was used to detach thin long skimming flakes, but billets are usually of wood or antler, bone is very hard unsatisfactory because of the porous composition of the ends, one minor exception is the ^{antler} distal end of the cannon bone of a horse. ^{To the antler of a deer is strongly curved & light} The horse and the large antlered animals are not common to all parts of the world where flintworking took place. Man often had to resort to other than billets for flake removal. My personal thought is that percussors of the right quality stone were by far the most most common percussion tool used to make flakes and blades. Here to the texture and qualities of the hammerstone must conform to the nature of the material being flaked.

Good hammerstone material is often as hard to find as good material for flaking and the wear patterns on the hammerstones can often be related to the detached flakes or blades and be equally diagnostic. The contact area between the hammerstone and the material being flaked is an area called the platform and it is this proximal part of the flake or blade that can provide much information about the technique used, the hardness or softness of the percussor, the stages of implement production ##, the simple detachment of a flake or blade to be used as is, ## to be modified into another simple tool, discarded or preparation flakes. The word platform is a shot gun term because of the varied nature of the percussor striking the material, the platform at the first stage may be the natural unaltered surface of the material being flaked, the angle of the platform from the dorsal to the ventral side may vary from a right angle to an acute angle, It can be a specially prepared negative flake scar, prepared by multiple flake scars, natural cortex, a plane fracture, the platform may be isolated from the material being flaked, the platform may be at varied distances from the margin, it can be relieved for esier detachment by removing flakes from each side and the face. The platform may be rough ground and be detached by lessened force or it may be polished and rounded to give the area greater strength. The methods are many and varied and can be of diagnostic value in determining techniques of flake and blade removal. Too the platform character may change at different stages of manufacturing sequences of stages. Lithic materials in the form of cores used to produce a series of usable flakes or blades rather than a single artifact will be more consistant in their character atributes than making a core tool like a simple oviate biface. However flakes and blades will vary in form as the core is reduced in size tho the platform part will remain much more consistant. Generally the farther in from the margin the thicker the bladeor flake, but this feature is not always true, a very thick blade or flake can be removed with a very small platform if properly prepared and positioned.

The path of flight, of the percussor, whether it be arclike or a straight line, ## and the angle of the flight path in relation to the angle of the platform, the speed of travel of the percussor to the platform, and the inertia or support of the piece being flaked all have definite bearing on the character of the resultant flake.

The exterior surface or dorsal side of the flake or blade to be detached normally controls the width ~~###~~ and margins length/of the flake, but not necessarily the thickness. The surface may be natural or prepared by preliminary flaking to design the dimensions of the preconceived flake or blade.

Time does not permit one to go into minute detail/ of of the prenoted conditions and circumstances necessary to detach a flake. However by using a method or a cluster of pre-conceived conditions, flakes may be made at will, with the desirable dimensions of width, thickness, length and termination and/ ~~in###~~ when such control is achieved be able to make a variety of artifacts. Another factor most important in flake or blade making is the human participation of coordinating hand and eye and compensating for the ever changing conditions of the material being flaked. He must have exacting muscular control in order to adjust the amount of force necessary to induce fracture of a pre-conceived area. It is fortunate for the archaeologist that some mistakes and miscalculations ~~###~~ much about ~~#####~~ were made adding/ to the information ~~##~~ flaked tool industries.

~~#####~~

More often than not the archaeologist is confronted by a following list of problems ^{which} ~~that~~ are often answered by an ^{evaluation} ~~examination~~ of the lithic debris.

1, How was an artifact made and with what tools were used to make it? 2. Why was it made in a certain way, 3. Why were certain lithic materials selected for the artifact? 4. What was the tool intended for? 5. What task was the tool to perform. 6. Was the tool a multi-purpose tool? 7. How was the tool held in order to perform a specific function? 8. Was the tool hafted? 9. How was the tool hafted? 10. What was the action of the tool on the objective material? 11. Was the tool pulled or pushed? 12. Does the tool strike or press the objective material? 13. Was the tool used for scraping or cutting? 14. How can the angle of the tool edge be compared to the resistance of the material being formed? 15. What is the difference between attrition and corn polish? 16. What causes the striations on the working edge of the tool? 17. What are the directions of the striations on the working edge of the tool? 18. Was the tool used as a burnisher? 19. Do some softer materials being formed have an abrasive action on the tool? 20. How can use flakes be identified as opposed to intentional retouch? 21. What are the characteristics of use flakes? 22. What is indicated by a series of use flakes of certain character, termination, change of angle, increased resistance, improper use, beginners or apprentice, mishandling? 23. Was the tool abandoned upon completion of task? 24. Was the tool broken from accident, manufacture or imperfections of the material? 25. Was the tool exhausted from resharpening? 26. These are only a few of the problems encountered when evaluating lithic material. Each flake or artifact must be considered independently. Then clusters of like attributes will have diagnostic significance

W

The flake character is also influenced by both form and composition of the percussor, whether used in a fixed position or hand held and projected against the objective piece of lithic material. A hard, dense stone is selected for cleaving, quartering and the removal of large thick flakes, while for precision work and finishing, a percussor of yielding qualities is selected. A percussor must have a texture that will correspond with the material being flaked. A very hard stone percussor will cause the platform part to shatter and will not yield. Stone for a particular percussor is often difficult to obtain and they were much prized by the worker, he often transported them long distances, and retained them until they were accidentally broken or were exhausted. When one becomes accustomed to a particular hammerstone of the correct size, weight and friction he is loath to part with it. Possibly explaining the strange lack of percussors in aboriginal sites. The hammerstones selected to suit the materials being worked are of far more importance than the novice would believe. The percussors not only influence the character of the flake, but are in themselves diagnostic and can be related to percussion techniques. Those hand held or hafted are of a variety of shapes, sizes and textures, and upon examination provides clues as to the manner of use and can indicate a specific technique. When the worker holds the percussor in the hand and projects it to a predetermined platform on the lithic material, held in the other hand, it is known as Free hand direct percussion. This technique allows the worker considerably more freedom of movement than the use of the fixed percussor. If the worker is righthanded, the left hand can manipulate and maneuver the material being flaked and adjusted to the proper angle to receive the impact of the percussor. Free hand direct percussion with rest is much the same as free hand direct percussion, except a solid support is used to make the objective piece more inert. An example is the objective piece is placed on an anvil stone, reducing the inertia and results in the worker using less velocity of the percussor and obtaining flatter blades of flakes than when using freehand direct percussion without rest.

DIAGNOSTIC VALUE OF LITHIC DEBRIS

More than 99 $\frac{1}{4}$ % of the history of mankind is represented by stone residue, the only epitaph of mans survival. If the quest for knowledge of mans past is to be extended behind a few millenia , the making and use of non perishables artifacts will have to examined and evaluated.

Evidence of mans past is represented in the form of flakes, blades, broken discarded or exhausted implements and only occasionally/undamaged artifacts ~~#####~~ , the bones of man and the animals upon which he preyed/allocated.

Often many stone tools are not reconized as such. A simple flake can often perform a simple cutting task and then is discarded as soon as the job at hand was completed. The simple flake will often bear certain technological ~~#####~~ attributes that may be distinctive in particular time and space. The simple flake may have diognostic characteristics that will indicate the technique used for it's detachment. More sophisticated implements made to perform specific tasks often show stages of completion. Each stage of development may show the use of different techniques and tools used to tedach the flakes.

When Stoneage man was able to develope techniques that would allow him to control the form of the flake and govern the size, length, width, thickness, thinness, curvature and termination, he could then produce a variety of useful implements to suit his enviõment.

It is not possible at this time to examine all of the ^{KNOWN} diverse methods of flake and blade detachments made by extinct cultural societies. Direct percussion, indirect percussion, pressure, and a combination of percussion and pressure are very general clasifications of multitudes of techniques, and combinations of techniques. There is no way ^{of knowing} how many prehistoric techniques of percussion and pressure were used, but the number was vast. Often the completed artifact only bears the last series of overlapping flake# scars with the coresponding flãkes missing,

or a reverse of the situation, when the flakes are found in a workshop area
the completed artifact is missing. ~~###~~ ^{diagnostic features} The platform and other ~~flake~~ characters
useful for determining techniques are on the flakes rather than on the scars
The flake retains more diagnostic features ~~###~~ than the flake scar, because
the platform is removed with the flake and other characteristics and traits
useful in determining the mode of detachment, and stage of completion.

A few features to be considered are the character of the platform and the proxi-
al end of the flake or blade, character of the bulb of force, the area
contacted by the fabricator, flake lips or overhangs, curvature, undulations,
terminations, character of the dorsal surface, general form, ~~###~~
dimentions, and the workers intention and mistakes.

On the basis of experiment using percussion implements, I am now concentrating on stone as a percussor because a variety of rocks are usually more widely available than extremely hard woods and antler. Because of the perishable nature of wood and antler an accurate comparason of the use of wood and antler virsus stone cannot be made, but paleontological and zooiological evidence limit the use of antler. Hardwoods suitable for billets too have certain limitations. Stone has an advantage that it can be found in a variety of textures and sizes. A hammerstone must be used in the early stages of stone tool making, even tho a billet of antler or wood is used in the advanced stages. ~~Stone percussor~~

indicate a specific description.

and upon examination provides clues as to the manner of use and can

those hand held or held are of a variety of shapes and sizes and textures.

in themselves diagnostic and can be related to behavioral descriptions.

The percussors not only influence the character of the flake, but are

The percussors not only influence the character of the flake, but are in themselves diagnostic and can be related to percussion techniques. Those hand held or hafted are of a variety of shapes ~~##~~, sizes and textures, and upon examination provides clues as to the manner of use and can indicate a specific technique.

advanced stages. ~~#####~~
 of stone tool making, even tho a billet of antler or wood is used in the
 in a variety of textures and sizes. A hammerstone must be used in the early stages
 too have certain limitations. Stone has an advantage that it can be found
 zoological evidence that the use of antler. Hardwoods suitable for billets
 wood and antler where stone cannot be made, but paleontological and
 betterable nature of wood and antler in accurate comparison of the use of
 more widely available than extremely hard woods and antler. Because of the
 concentrating on stone as a material because a variety of rocks are available
 on the basis of experimental using biological implements, I am now