Were "Utilized Flakes" Utilized? An Issue of Lithic Classification in Ontario Archaeology

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In this paper, I challenge the use of the "utilized flake" category in current Ontario lithic classification. The typological systems that include "utilized flake" as an independent category are problematic because "utilized flakes" are not a unique type, but rather a group of flakes with edge-damage caused by use. Moreover, blind tests demonstrate the problems associated with accurately identifying utilization without magnification. Low power magnification analysis of specimens from two archaeological sites in southwestern Ontario demonstrates the advantages of this method over more subjective methods of identifying use-wear.

Introduction

A category used in most, if not all, analyses of lithic assemblages from Ontario is that of the "utilized flake." This term is used extensively in published and unpublished papers, monographs, and reports that deal with lithic materials. Artifacts identified as utilized flakes are classified as *informal* tools as opposed to deliberately shaped *formal* tools (e.g., bifaces, scrapers, etc.). Although it holds true that any debitage flake may have been used, and that wear marks on flakes can be recognized, the use of "utilized flake" as a type category remains problematic. In this paper, I support this proposition through both blind tests of experimentally made flakes and microscopic analyses of flake samples from two archaeological sites in southwestern Ontario. The study suggests that the macroscopic methods of distinguishing utilized flakes from debitage currently used by archaeologists in Ontario are misleading. The term *utilized flake* should refer only to those flakes which exhibit use-wear as determined by proven techniques of use-wear analysis. Use-wear should be considered an attribute of flakes, reflecting function, rather than as a separate category within flake typology.

A Critique of the "Utilized Flake" Category in Ontario Archaeology

Lithic classification schemes currently used in Ontario often simply divide lithic assemblages into two large categories: tools and debitage (non-tools). Tools normally include bifacially and unifacially retouched objects, sometimes lumped together as *formal tools*, and utilized flakes which are categorized as *informal tools*. In most survey and excavation reports, the separation of utilized flakes from other reduction by-products has been made in order to assist in the functional interpretation of tools (e.g., Bursey 1994:51; Timmins 1997:115). Whereas this distinction may appear to simplify the process of the functional analysis of lithic artifacts, it actually causes typological confusion. The problems arise when the term "utilized flake" is defined differently by different archaeologists.

Although it is commonly recognized that utilized flakes are those flakes bearing edge damage, the criteria used to define damaged edge(s) remain unclear. Peter Storck has used the designation "utilized flake" or "worked flake" for those that "exhibit a small amount of unifacial margin-al retouch along either a single edge or a short segment of one edge" (Storck 1974:6, 1978:37). Paul Lennox has characterized "utilized flakes" as those specimens showing "use retouch resulting in the removal of a series of small flakes (less than 2 mm) from one or more edges" (Lennox 1986:228, 1993:6). Both authors see minimal secondary retouch of margins as an indication of flake utilization. While Storck considered the shapes of used margins (straight, convex, or con-cave) to be evidence of use, Lennox considered size to be a criterion for distinguishing use

retouch from deliberate retouch. Recently, Storck modified his definition of utilized flakes to emphasize the size of the edge damage/retouch, stating that "utilized flakes also exhibit very small, irregularly spaced flake removals along one or more edges, but the flake scars are so small as to suggest they were formed by use wear rather than by deliberate pressure retouch" (Storck 1997:84-85). There is little consistency in the criteria used to define utilized flakes among other researchers. Some search for evidence of margin-al retouch (Deller 1976:14), others look for edge-nibbling (Finlayson 1977:179) or for continuous flake scars (Bursey 1994:51, 1997:90; Timmins 1997:115). An assumption underlying all of these definitions is that edge modification was caused by use of the flake as a tool. Edge damage, however, may be caused by other factors as well, including weathering, trampling, trans-port, and manufacture (Tomenchuk 1985:508). I agree that it is useful to distinguish edge-damaged flakes from flakes with unmodified edges, since the former may have greater potential of having been utilized. Thus, in practice, such edge-damaged flakes seem more important than unmodified flakes. In a typology based on morphology, however, a group of flakes with traces of use could be drawn from any category of object, including unmodified, retouched, or shaped flakes, as well as from flakes representing different stages of reduction. These edge-damaged flakes should not be considered to belong to an independent category of informal tool based on superficial appearance. There may be utilized primary flakes, utilized biface thinning flakes, utilized blades, and so forth.

Typologies constructed by lithic analysts in Ontario that include utilized flakes are biased by the assumption that all lithic artifacts fall into one of two groups: those that were used (tools including utilized flakes) or those that were unused (debris including chunks and shatter). Use-wear analysis demonstrates, however, that not all artifacts classified as tools on the basis of morphology were used. Moreover, those artifacts that were used may not have been used in the manner implied by their conventional names or shapes (e.g., a scraper may not have been used for scraping). All objects, whether shaped, edge-damaged, or debitage, should therefore be treated equally as use-potential objects.

There have been no studies showing how "non-magnification" methods might work to determine utilization, or to distinguish utilization from other causes of edge-damage. John Tomenchuk, who conducted a well-controlled experiment on edge-damaged types, noted that "it is my experience that at present, no criterion or technique exists that is infallible in distinguishing between manufacture and utilization damage" (Tomenchuk 1985:508). William Fox (1979:68) correctly observed that to identify utilization, one must show actual use retouch and use polish. Methodologically, in order to deter-mine whether or not a flake was actually used, one must rely on careful observation of use traces, through microscopic examination of a combination of microchipping fracture and abrasions. Yerkes and Kardulias correctly point out that "microwear analysis has helped change our view of lithic typology, especially as it relates to functional categories of artifacts such as `utilized flakes"' (Yerkes and Kardulias 1993:103).

Blind Testing of the Macroscopic Approach to Determining Use

To illustrate the problems of macroscopic identification of utilization, I conducted an experiment, at the University of Toronto in early 1995, which was similar to that performed by Young and Bamforth (1990). Three graduate students volunteered to participate in a blind test. The three individuals had had university training in lithic analysis and typology. Each was given a set of 45 pieces that consisted of both experimentally used and unused flakes. Each was informed that the sample included flakes that had been utilized for various tasks, flakes that had been intentionally retouched, and flakes that were entirely unmodified. On the basis of macroscopic inspection alone, two of the participants were asked to identify which flakes had been used. The third participant was permitted to use a l0X hand-lens. The goal of this exercise was to determine how accurately a practitioner could judge

whether a flake had been utilized and which factors might obscure his or her judgment. Thus the experiment is quite replicable.

The results, presented in Table 1, indicate that about half the specimens were misinterpreted. Coincidentally, the scores of all three participants are the same: 25 out of 45 items (55 percent) were identified correctly. Use of the hand lens did not make a difference in the results. During the test, I observed that the participants regarded some edge-retouched or abrasion flakes as utilized flakes. Most unretouched and unused flakes (numbers 12-17) were identified with relative ease. It should be noted, however, that this experimental set did not include naturally or culturally damaged items that were the result of washing, transporting, trampling, or trowel retouch. These types of damage are common in archaeological samples. Among the utilized experimental specimens, almost all flakes used on soft materials such as meat and hides (numbers 25-28, 31, 34, 38, 43), were incorrectly identified. Polish, rounding, and microchipping fractures resulting from these activities can only be observed under a microscope with 50X or higher magnification. By contrast, flakes used on hard materials such as bone, antler, and dry wood bore clear chipping scars on their utilized edges, which were detected easily and identified correctly. Three exceptions were flakes used to bore through either hard or soft materials (numbers 23, 25, and 34). These flakes were misinterpreted because only their tip portions were utilized; the lateral edges were left undamaged.

These results match those of Young and Bamforth's experiment (Young and Bamforth 1990:Tables 2 and 3). Their test involved nine archaeologists and eleven used and unused flakes, some of which were minimally retouched. They too concluded that their results were "not very encouraging: only 36 out of 144 possible inferences, or 25 percent, were correct." (Young and Bamforth 1990:404). Their experiment, supplemented by ours, suggests that simply sorting utilized flakes by distinguishing edge damage is highly inaccurate. Macroscopic identification of used edges on flaked stone artifacts should be carried out with extreme caution if it is to be carried out at all (Young and Bamforth 1990:408).

Alternative Approaches to Use-wear Analysis

I suggest that the only way to identify a utilized flake is through microscopic examination of use-wear. Use-wear analysis is a means of studying use-related edge damage on stone tools. Since the introduction of Sergei Semenov's translated monograph *Prehistoric Technology* (1964), use-wear analysis has become an essential component of lithic artifact analysis in North America. A historic review of this particular method is not appropriate here (but cf. Hayden [1979]; Kamminga [1982]; Keeley [1974, 1980]; Odell [1975, 1977]; Odell and Odell-Vereecken [1980]; Tringham et al. [1974]). Use-wear analysis has three analytic forms (Grace 1990): edge-damage analysis, edge-wear analysis, and micro-wear analysis.

Edge-damage analysis is based on an examination of the morphology of used edges. It relies on macroscopic traces of use-wear. This method has no specific microscopic requirements and so has been widely adopted because of its ease of application. Examples of this edge-damage analysis are seen in Schiffer's (1976) study of the Joint lithic assemblage, and in the analysis of stone tool assemblages from the Formative Oaxaca in Mexico (Parry 1987), and the Kintampo Complex in Northern Ghana (Casey 1993). These studies have concentrated on edge sizes, edge angles, shapes of edges, and the degree of modification and finishing, to arrive at "use-potential categories." Yet, the seeming ease of this approach has made it that much easier to misuse the concept of the utilized flake in lithic classifications.

The two other methods of use-wear analysis both rely on magnification of tool edges — one using relatively low-power (<I00X) magnification, the other using high-power (>100X) techniques. Edge-wear analysis, using reflective-light stereoscopic microscopes and low-power magnification, considers the overall configuration of micro-fractures and abrasion to obtain information about tool motions and the range of contact

Table 1. *The results of the blind tests on utilized flakes.*

Specimen	Raw Material	Edge Modification	Utilization	Participants' Assessments of Utilization		
		A			B	C
1	Onondaga	retouched	none	T	T	F
2	Onondaga	retouched	none	T	F	F
3	Onondaga	retouched	none	T	T	T
4	Onondaga	retouched	none	T	T	F
5	Onondaga	retouched	none	F	F	F
6	Onondaga	retouched	none	F	F	T
7	Haldimand	retouched	none	F	T	T
8	Haldimand	retouched	none	T	T	T
9	Haldimand	retouched	none	T	F	F
10	Haldimand	retouched	none	F	F	F
11	Haldimand	retouched	none	F	F	F
12	Haldimand	none	none	T	T	T
13	Onondaga	none	none	T	T	F
14	Haldimand	none	none	T	T	T
15	Haldimand	none	none	T	T	T
16	Onondaga	none	none	T	T	T
17	Onondaga	none	none	F	T	T
18	Obsidian	none	none	F	F	T
19	Obsidian	retouched	none	F	T	F
20	Obsidian	retouched	none	F	T	F
21	Obsidian	none	none	T	F	F
22	Obsidian	none	scraping hard wood	T	T	T
23	Obsidian	none	sawing hard wood	F	F	F
24	Obsidian	none	scraping hard wood	T	T	T
25	Onondaga	none	drilling fish skin	F	F	F
26	Onondaga	none	sawing hard wood	T	F	F
27	Onondaga	none	drilling pig hide	T	F	F
28	Onondaga	none	scraping fish	F	F	T
29	Onondaga	none	cutting pork meat	F	F	F
30	Onondaga	none	cutting fresh wood	T	T	T
31	Onondaga	none	scraping carrots	F	F	F
32	Onondaga	none	sawing antler	T	T	T
33	Onondaga	none	cutting fresh wood	T	T	T
34	Onondaga	none	boring carrots	F	F	F
35	Onondaga	none	scraping dried hide	T	T	T
36	Onondaga	none	slicing dried hide	F	F	T
37	Onondaga	none	sawing dried bone	T	T	T
38	Haldimand	none	cutting carrots	F	F	T
39	Onondaga	none	scraping soaked bone	T	T	T
40	Haldimand	none	sawing dried bone	T	T	F
41	Onondaga	none	scraping hard wood	T	T	T
42	Onondaga	none	scraping fresh wood	F	T	T
43	Onondaga	none	scraping fresh bone	F	F	F
44	Onondaga	none	scraping dried hide	T	T	T
45	Onondaga	none	scraping sweet potato	F	F	F
		Percentage of Correct Answers		**55.6%**	**55.6%**	**55.6%**

materials in terms of their hardness (e.g., Lewenstein 1987; Odell 1977, 1996; Shea 1991). By contrast, micro-wear analysis, using either incident light microscopes or scanning electron microscopes (SEM) and high-power magnification, concentrates on the formation and distribution of use polish (e.g., Keeley 1980; Vaughan 1985; Unger-Hamilton 1992; Yerkes 1987).

There has been a long debate over the relative merits of low- and high-power use-wear techniques. For years, analysts have argued over whether the low-power approach provides accurate information on polish and striation-wear

resulting from abrasive use (Odell 1985, 1990; Richard 1984) and whether the high-power is more precise than the low-power technique. Although this latter claim is partly true, the low-power technique has demonstrated its unique advantage and accuracy in use-wear assessments (Odell 1996; Shea 1987). Much of the debate stems from the longstanding belief that the low-power use-wear technique focuses only on micro-fracture. This misunderstanding can be traced to the early work of George Odell (1974, 1977, 1981), which over-emphasized micro fractures as criteria for distinguishing types of wear. The reason for this emphasis was to call attention to edge fractures caused by use. At the time, only polish and striation were considered to be reliable indicators of use. The low-power technique, in fact, concentrates on the combination and configuration of the variables of both microfracture and abrasion in order to assess with some degree of confidence how the pieces under examination might have been used. Over the past twenty years, it has been commonly agreed that both the low- and high-power techniques have their merits in informing us about use patterning on stone tools

The use-wear analysis carried out in this study employs the low-power technique, described in Odell and Odell-Vereecken (1980; cf. Odell 1977, 1981; Tringham et al. 1974). Prior to the examination of archaeological samples, I carried out an extensive experimental study on a collection of 227 pieces with use-wear related to about 100 different tasks. All selected pieces were examined under a Nikon SMZ-1 stereoscopic microscope with reflective lighting. The artifacts were first scanned using 13-30X magnification to look for areas of possible utilization. Edge damage and edge rounding were the two main criteria determining whether or not pieces were used. Candidate pieces for use-wear were then examined at higher magnifications to detect polish and striation. I frequently used the range of 30X to 80X, but >80X was often used for pieces with faint traces of use (such as those resulting from use on soft materials). Once the use area was located on the piece, the wear type was assessed according to the type of tool motion that produced the wear (e.g., cutting, slicing, drilling, etc.) and the resistance of the different materials being worked. Finally, the exact tasks for which the item was used (e.g., slicing skin or scraping hard wood) were inferred according to wear types defined.

The wear types were defined through experimentation with different tool motions applied to different materials. As a result of these experiments it was determined, for example, that cutting and sawing generally produces scarring on both sides of the working edge, however, cutting is also characterized by a unidirectional pattern of scar orientation, whereas sawing is represented by a bi-directional scar pattern. For both motions, striations are parallel to the edge. Polish is likely to occur on both surfaces of a working edge, along the line of the edge. Scraping and shaving produce mostly unifacial scarring, but polish also appears frequently on the side that is in contact with the material being worked. Planing or whittling often produces more abrasive wear on the surface than does scraping and shaving. Drilling is a rotation motion, which results in bi-directional scarring that is symmetrical along the axis of the use edge.

The low-power technique is more reliable when used to identify tool motion than it is for the identification of the material to which the tool was applied. It is possible, however, to use this technique to examine variations in wear type, and thereby identify the general degree of resistance which different materials present when worked. Working on soft animal material such as fresh skin, fat, or meat may result in extensive matte polishing and light edge rounding, while work on soft vegetal material mostly produces bright polish, if the tool is used long enough. Striations are not generally present. Medium-resistance materials include seasoned or dry wood, dry hide, frozen meat, and fresh animal bone. Scarring from woodworking typically exhibits medium to large scars and a "rolled-over" pattern on the working edge. Abrasion of medium-resistance animal material includes rapid edge-rounding, matte polish, and occasion-al striations. The scar patterns resulting from the working of such material exhibit contiguous or

clumped patterns of medium-sized feather or step terminations. Hard or high-resistance materials include dry animal bone, antler, and inorganic hard materials such as sandstone. The most reliably diagnostic type of wear resulting from working high-resistance materials are step-terminated, medium-to-large sized scarring, and roughened or crushed edges. The precise form of polish and scarring may be used to distinguish working of high-resistance dry animal bone from working of medium-resistance dried wood. Matte polish and contiguous patterns of large termination scars normally appear when hard animal materials are worked, whereas bright polish and uneven patterns of large hinge fractures are produced when dried wood materials are worked.

An Application of the Low-Power Method to Archaeological Samples

Samples of edge-damaged flakes, each originally identified as "utilized" on the basis of macroscopic inspection, were selected from two archaeological sites — the early Late Woodland Lone Pine site (AfGx-113) and the multi-component Middle and early Late Woodland HH site (AhGw-81) — to determine whether these specimens were actually utilized.

The Lone Pine site was excavated in 1993 and 1994 by an archaeological team from the University of Toronto, supervised by the author. Located near Cayuga, on the lower Grand River, the site lies on a low plateau and is surrounded on three sides by Rogers Creek. Over ten thousand lithic artifacts were recovered from both surface collections and excavations at the site (Shen 1995, 1997; Smith and Crawford 1997). Trevor Ormerod (1994, 1997) completed a preliminary analysis of the chipped stone tools, and identified 302 utilized flakes as "featuring use-damage but no retouch" (Ormerod 1994:65). These utilized flakes constitute 86 percent of the "tools." Following Ronald Williamson's (1985:311) definition of utilized flakes, Ormerod (1997:28) distinguished use-damaged edges from deliberately retouched edges on the basis of marginal flake scar length (i.e., scars <1 mm in length were attributed to use damage). For this study, 173 of these Lone Pine "utilized flakes" were selected at random for a detailed microscopic analysis to assess the validity of their identification.

The HH site is located at the western end of Lake Ontario, near Stoney Creek, and was partially excavated by Ministry of Transportation archaeologists in 1989 (Woodley 1996). The HH lithic assemblage and preliminary analytic data were generously provided by the Ontario Ministry of Transportation. From those items identified as "utilized flakes," 204 pieces were selected for use-wear analysis.

As indicated in Table 2, my low-power magnification analysis would suggest that only 40 to 42 percent of the macroscopically identified "utilized flakes" from either site were actually used. Over half of the "utilized flakes" exhibited no use-wear whatsoever. While the possibility that some pieces were used only lightly or briefly, and so may not exhibit clear use-wear cannot be ruled out entirely, the microscopic examination clearly suggests that some of the traces of edge damage that were regarded as evidence of utilization were caused by natural agencies rather than intentional use.

At Lone Pine, the flakes were used primarily for sawing or scraping wood, although many flakes also show evidence for use in butchering tasks (e.g., skinning animals) (Shen 1995, 1997). At HH, wear types on 83 pieces that exhibit use-wear evidence suggest that the most common tasks were cutting or slicing flesh, presumably that of fish, although butchering small game animals or meat-preparation was also an

Table 2. *Assessment of the use of "utilized flakes" from Lone Pine and HH through low power magnification analysis.*

Site	Used Flakes (n)	Unused Flakes (n)	Use Rate (%)	Total (n)
Lone Pine	73	101	41.95	174
HH	83	121	40.7	204

important activity at this late Middle Woodland site. Use-wear evidence for scraping and shaving of wood is also frequent. At both sites, evidence for drilling bone and/or antler and wedging wood is also present, but is less common.

Use-wear analysis of flakes from these sites indicates that over 50 percent of the "utilized flakes" are edge damaged by causes other than deliberate use. These forces include the trampling and transporting of artifacts and damage incurred during their excavation. To identify such incidental damage more precisely would require substantial experimentation beyond the scope of this paper. However, one type of secondary edge damage worth noting is prehension wear. Prehension wear is caused by contact between the tool and its haft, or the hand of the tool-user. Both hand and hafting prehension wear were identified from the analyzed samples. Two examples (Figure 1) illustrate the impor-

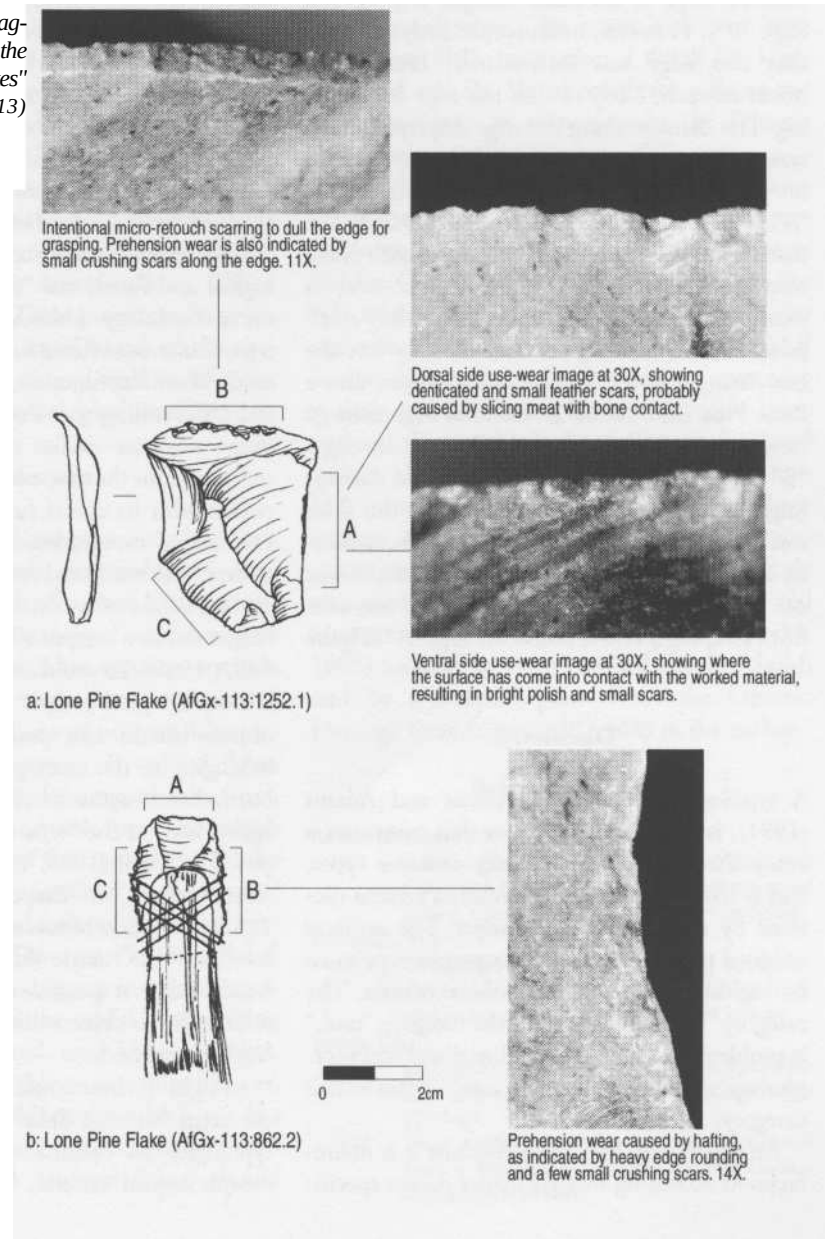

***Figure* 1.** *Low power magnification examination of the use- wear on "utilized flakes" from the Lone Pine (AfGx-113) site.*

tance of correctly identifying prehension wear when assessing the function of flake tools.

A large flake from Lone Pine (#1252.1) possesses a continuous pattern of macroscopically visible fracturing along its distal edge (Figure 1:a, edge "B"). The distal edge of this piece is convex in plan view (Figure 1:a). The convex shape of this edge, combined with the macro-pattern of fracturing, would conventionally be used to interpret this flake as a scraping tool bearing a working edge at its distal margin (Figure 1:a, edge "B"). However, microscopic analysis shows that this edge was intentionally blunted by micro-retouch, likely to dull the edge for grasping. The damage along the edge displays continuous, uniform fracturing, which is the result of intentional retouch. The actual working edge is "A" (Figure 1 a), the entire length of which was damaged by cutting or slicing meat with bone contact. Another area of prehension wear is found along edge "C," which was possibly compressed while holding the tool to carry out the butchering activity. The second example, also a Lone Pine flake (#862.2), exhibits edge damage on opposite lateral margins (Figure 1:b, edges "B" and "C"). The placement of this damage might easily lead to the conclusion that this flake was a cutting tool. Microscopic analysis, however, shows that the scarring on both lateral edges can be attributed to hafting and that use-wear from scraping wood is found on edge "A" (Figure 1:b).

Discussion

A typology, according to Adams and Adams (1991), is a conceptual system that comprises a comprehensive set *of mutually exclusive* types, and is based upon a set of common criteria dictated by the goals of the analyst. The artifacts assigned to the same lithic category or type must be logically related through these criteria. The category "utilized flake," like the category "tool," is problematic because both functional and morphological criteria are used to assign flakes to this category.

An object may be a "tool" because it is manufactured according to a particular design specification for a particular purpose (like a screwdriver), or because it is utilized as such. Some designs reflect their functions, such as projectile points, scrapers and drills. These objects exhibit regular, patterned alterations of edges and surfaces as a result of deliberate retouch. Their intentional modification for specific use—their morphology—makes them "tools," as this word is commonly understood and used by Ontario archaeologists engaged in lithic classification. A problem occurs, however, when the word "tool" is used to refer to objects classified according to functional criteria as well. In a functional typology, this same word "tool" may refer to artifacts that have been used, regardless of their shape. They were not, strictly speaking, designed for the purposes that they ultimately served. The word "tool," then, has two different meanings.

The critical distinction between the morphological and functional "tool" categories is based on methodology. Although shaped artifacts have a particular use-related function or functions, the study of artifact function is methodologically distinct, depending as it does on use-wear analysis. Some use-wear studies reveal that the function inferred from the shape of the artifact is not consistent with its actual function in the past. For example, a morphological "scraper" might not always have been used for scraping whereas, conversely, a flake of no distinctive shape might have been used as a scraper (Odell 1981, 1996; Shen 1997, 1998). To avoid confusion in terminology, a morphological scraper and other type-specific objects should not, perhaps, be considered as belonging to the more general category of tool, but rather to some other-named conceptual category, such as the "type collection," a term proposed by Odell (1985, 1996, 1998), or, perhaps, "formed type" or "shaped object" (Shen 1997, 1998). Adoption of one of these alternative terms for "tool" in Ontario lithic classificatory studies would make it possible for the term "tool" to refer solely to objects that are interpreted as having been utilized.

In light of these considerations, it is clear that the term "utilized flake" has no place in lithic typologies, as defined by either functional or morphological criteria. Current morphological

flake typology relies on the raw material reduction sequence in the production of finished items (e.g., primary flakes, secondary flakes; bipolar flakes; biface thinning flakes). No function is implied, nor is there any shaping (retouch) of flakes involved and, as previously discussed, utilization cannot be assessed from analysis of macro-fracturing or edge damage.

Finally, used pieces or functional "tools" may not always have been manufactured for use purposes. For example, any byproducts of core reduction, including flakes, shatter and spent cores, could be selected for expedient use. Use-wear analysis of cores suggests that cores or core fragments could be used for various purposes (Brumbach 1987; Odell 1996:115). A function-al study of cores from the Princess Point Grand Banks site showed that about 15 percent of the cores and core fragments exhibit types of use-wear consistent with woodworking (Shen 1997:123-130; 1998). These pieces can be properly classed as "utilized cores" based on the necessary microscopic analysis and with no reference to worked edges or morphological specifications.

Conclusions

Experimental study and use-wear analysis of "utilized flakes" from two archaeological sites demonstrates a weakness of current lithic classification in Ontario archaeology. I would suggest that any application of lithic typology exclude "utilized flakes." This study has demonstrated that (1) current definitions of utilized flakes are ambiguous and inconsistent; (2) utilized flakes are not morphologically distinguishable types, but result from demonstrable use-wear which may occur on a variety of flake types; and (3) the identification of flakes as utilized in the absence of proper equipment and training produces highly inaccurate results. The term "utilized flake" should not be used as a category in a flake typology although it can still be useful in describing general patterns of tool use. Utilized flakes, together with utilized objects or utilized pieces, should refer only to objects for which use has been determined through microscopic examination. Use of the term "utilized flake," should mean that a flake, retouched or not, bears use-wear that reflects a certain use-task, as determined by proper use-wear analyses. Similarly, any shaped objects like projectile points, scrapers, and drills, as well as cores and core fragments, become "utilized pieces" or "utilized objects" once they are actually used. These utilized pieces are, in fact, functioning "tools," regardless of whether or not they were intention-ally produced as such.

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