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John C. Whittaker, *Flintknapping. Making and understanding stone tools*. University of Texas Press, 1994. ISBN 0-292-79082-1 (cloth), ISBN 0-292-79083-X (paper). 341 pp.

The text on the back cover of *Flintknapping. Making and understanding stone tools* asserts that the book was written for a wide amateur and professional audience—both for practicing knappers and for teachers of the history of technology, experimental archaeology and stone tool analysis. As a member of the latter category who has also dabbled in flintknapping, I concur in this assessment. I would recommend the book to archaeologists in general but in particular to those who deal with lithic materials. Although I am perhaps not the most qualified to assess the book's usefulness for knappers, my opinion is that those who intend to try their hand at the art, those who do knap and wish to improve, or those who are interested in understanding the processes and their causes, will also find the book useful. The fact that the author himself is both an archaeologist and an accomplished knapper has resulted in a book which is a refreshing combination of practical advice about how to avoid hinge fractures, while at the same time it points out why an archaeologist should want to know why a knapper wants to avoid a hinge fracture. Many of the chapters in *Flintknapping* are concerned with the nuts-and-bolts of the craft, but Whittaker continuously urges his readers to consider the archaeological implications of the particular knapping activity which he is describing.

Whittaker writes in the first person, using an informal style and many anecdotes. The language is clear and easily understood, although occasionally too colloquial (e.g., referring to cigarettes as "stink-sticks", p. 83). For those who are interested in further reading there is an extensive bibliography. Whittaker's use of the scholarly tradition of including row upon row of references in parentheses in the body of the text was distracting, however. An annotated bibliography for each chapter would probably have served his readers better.

The first five chapters of the book are concerned with introductory topics such as raw

materials and how they react to force, safety, and a brief history of flintknapping. In these chapters Whittaker provides a clear and easily understood discussion of the complicated phenomenon of fracture mechanics and of the characteristics of various knappable materials. He includes practical advice on the "knappability" of different materials, including man-made substances such as glass bottles and toilet bowls(!). Although he tries to include European and Mesoamerican materials in his discussion, Whittaker's book shows a clear bias towards the North American lithic materials. In a section on ethical considerations Whittaker brings up the problem in which debris or objects made by modern knappers can be mistaken for archaeological remains. The risk of this occurring increases with the number of knappers, and the necessity for a code of ethics is of the utmost importance. The Society of Primitive Technology recently published a statement of ethics in its *Newsletter* (No. 1, Sept. 1995). We cannot overemphasize the necessity of holding all contemporary knappers to such standards.

Chapters 6 to 9 make up the heart of the book, as it is here Whittaker gives step-by-step descriptions of the most important knapping techniques. In my review I will not comment on knapping details but will confine my remarks to points which can be of interest to an archaeological audience. In an interesting departure from convention, Whittaker advocates learning to pressure flake before advancing to soft hammer percussion and bifacial techniques. His motivation for this (found on page 129) is that the principles for the first two of these techniques are very similar. However, pressure flaking allows the knapper to observe what is happening and to apply the principles at a lower level of hand and eye skill. This is just one example of Whittaker's intellectual approach to his practical subject matter.

The topics he discusses in these chapters include hard-hammer percussion, pressure flaking, soft-hammer percussion and bifaces, and blades and fluting. Each chapter includes a summary of the essential points for the technique described, and prehistoric examples of artifacts made using the techniques. The order

in which the various skills are introduced is logical and allows the apprentice knapper to progress from simpler to more complicated techniques. One exception to this is the discussion of platform preparation, which I think should have been placed after the section describing how to start a core (pp. 113 ff.). I must confess I am also somewhat surprised that Whittaker uses Levallois flaking as a fifth example for beginners to follow when practicing hard-hammer percussion. The Levallois technique is multi-stage and quite complicated and it is my understanding that it requires a good deal of knapping skill to master.

There are several themes of general and more theoretical interest running through these "how-to" chapters. I would like to mention two of these, because they are themes which are of particular interest to the archaeologist.

The first of these themes involves the knapper's mental approach to knapping. On numerous occasions Whittaker exhorts the knapper to think about what she or he is doing, to plan ahead, to visualize the finished piece, etc. Besides being good advice for the knapper, such statements open up interesting possibilities for the lithics analyst. If knapping complexity is dependent upon the ability to plan ahead, perhaps it is possible to reason backwards from knapped products to cognitive processes. Closely associated with such reasoning is the idea that stone tool manufacture can be divided into a series of stages (e.g., Fig. 8:21) characterized by major changes in technique or goals. In recent work in cognitive archaeology there have been attempts to identify these stages, often referred to as the *chaîne opératoire*, in an attempt to learn about prehistoric cognition (for example, C. Karlin and M. Julien's article in *The Ancient Mind*, 1994, ed. by C. Renfrew and E. B. Zubrow). Modern knapping experiments are obviously crucial to such studies.

A second theme of general interest to the archaeologist has to do with Whittaker's efforts to identify index fossils for various knapping processes which should be recognizable in prehistoric contexts. One example of this is Whittaker's description of what characterizes an

antler billet used in percussion work (p. 182). Another is Fig. 8.8 showing the features of a typical biface thinning flake. In Figs. 8.31–8.34 Whittaker demonstrates how he can apply his knowledge of knapping directly to prehistoric collections to explain the errors which caused the discard of particular biface failures at Grasshopper Pueblo. This kind of information is of great value to the archaeologist who is trying to interpret a collection, and it is precisely the kind of information which practical trials by modern knappers can so easily and efficiently provide. We can only regret that Whittaker's book does not contain even more information of this nature, and encourage future studies along similar lines.

The fact that Whittaker devotes eight pages to the technique of fluting illustrates the book's understandable, but regrettable, bias towards North American conditions and techniques. This has resulted in one omission which decreases the book's usefulness at least for a Scandinavian audience, namely the manufacture of quadrilateral axes. A great many European knappers devote much of their time to replicating these axes and I understand that the technique required is in many respects quite unlike bifacial technique or blade production. The question which then presents itself is whether there are techniques from other parts of the world which are not covered in the book.

In an illuminating passage on page 196, Whittaker discusses a technical detail regarding the placement of the platform relative to a biface's centerplane. After describing his own preference, Whittaker notes that some other knappers recommend the exact opposite. The difference of opinion, Whittaker concludes, is due to the complicated nature of the variables which include the angle of blow, the relative force of downward and inward components of the blow, beveling on the edge, etc. All of these interact in complex ways, are very hard to observe accurately, and are both performed and perceived differently by different knappers, Whittaker notes. Such insights illustrate the complexity of the knapping process. This discussion also gives us some idea as to the degree to which knapping decisions are limited by the physical laws involved and how much of an ob-

ject's final form is left to knapper choice. Such considerations can yield new insight on the classical typological questions of style vs. function in artifact studies.

The final two chapters deal with possible uses for stone tools and means of assessing these. By including these chapters as well as in his comments during the knapping instructions, Whittaker prevents his book from being a simple cookbook for knappers. In Chapter 10 he conducts brief discussions of stone tool use, with commentary about the usefulness of various edge types and tool morphologies from a purely functional point of view. One of the most important observations in the book is to be found on page 246: a retouched edge is usually not as sharp as an unretouched flake. Anyone who has knapped for five minutes is aware of this fact; one wonders how many typologically-minded archaeologists are.

Whittaker concludes his book with a chapter which explicitly discusses lithic technology as a part of mainstream archaeology. The concepts of typology and seriation, the form vs. function debate, and other topics are discussed in an uncomplicated manner and from the knapper's perspective. Whittaker lists four factors which may influence the shape of a stone tool: (1) material, (2) technology, (3) function, and (4) style. He discusses each of these in turn, again from the perspective of what a knowledge of knapping can reveal about them. As an example of his approach, I would like to present the case-study he uses when discussing the fourth variable, style (pp. 291 ff.). Whittaker had noted that common triangular projectile points found at the Grasshopper Pueblo appeared to fall into sets whose members were similar in appearance. Through statistical analysis of observations on the points he was able to confirm his hypothesis that these sets represented the products of individual knappers. In order to test whether known individuals would be distinguishable using the same kinds of data, Whittaker and four knapper friends tried to copy a single Grasshopper point from one burial, each knapper making several such points. In spite of the fact that all five knappers tried to copy the same point, all sets were distinctly different, and the same stat-

istics Whittaker had used on the prehistoric sets could be used to distinguish the modern ones. Here we have a very elegant demonstration of the efficacy of modern trials, which can be most useful when applied to specific questions within a wider interpretive framework. In a nutshell, that is the aim of Whittaker's book and also its major strength. There is no dearth of books and articles explaining how to make an Acheulean handaxe. Books and articles which raise the question of why we should do so, or what to do with it once we have made it, are less abundant.

Before closing I would like to make a few comments on the illustrations, which make up a large and essential part of the book. *Flintknapping—Making and understanding stone tools* is richly illustrated and Whittaker has wisely chosen line drawings rather than photographs when presenting flake or core characteristics. Whittaker and his artists have been successful in illustrating three-dimensional dynamic processes with clear and informative two-dimensional drawings. Artifact drawings were made by two artists, Ralph Luebben and Amy Henderson. Henderson's drawings show greater detail and a better sense of fracture dynamics than Luebben's. I found the constant shifts from one artist to the other disturbing and felt that such shifts made comparisons more difficult. A particularly unfortunate example is found in Figures 6.42–6.47 which show the same Levallois core at different stages of manufacture. Five of the drawings were done by Luebben, while the sixth and final stage was illustrated by Henderson. It is difficult to believe that the same core was being drawn. I must also complain about the male bias communicated by the drawings. Out of a total of nine knappers pictured (not counting the apes!), only one is a female. Since, as Whittaker points out (p. 297), we do not know the sex of prehistoric knappers, I would have preferred a portrayal of a knapper of indeterminate sex to avoid fostering gender bias. One final point concerns an illustration of blades in Fig. 9.4. Many archaeologists have a habit of illustrating blades with the proximal (platform) end downwards, as has been done here. Since I have yet to see anyone striking a blade from a core ori-

ented with its platform downwards, this has always struck me as an improper way to show blades. Previously I have attributed this convention to the fact that those who do not knap do not find this orientation unnatural; therefore, I am chagrined to find Whittaker propagating the same tradition here.

Flintknapping—Making and understanding stone tools concludes with an appendix listing resources for knappers, an impressive 30-page bibliography, and an index. Reading the addresses of resources, events and journals in the appendix, one is struck by the fact that there are no listings outside the United States. Flintknapping is not as widespread nor as organized in Europe as in the U.S., but skilled knappers are at work and various publications (most of which are not in English, however) do exist. However, the generous bibliography should prove a useful source for those wishing to pursue the topic, while the index, which also lists names of knappers whose work is illustrated in the book, further increases the book's value. A glossary defining the terms used in the text would also have been helpful to the reader.

Flintknapping—Making and understanding stone tools aims to be more than a book of instructions: make your own dagger in six easy steps. No doubt it is very difficult to learn to knap merely by studying a book—even one which is as pedagogically arranged as this one. I would venture to say that those who have never tried to knap, and do not intend to, will not benefit from reading Whittaker's book. What is more important is that Whittaker demonstrates not only the "how" but also the "why" of knapping. Written in an informal style and sprinkled with humor, the book is easily digested by those without formal archaeological training. However as his title implies, Whittaker strives to illustrate how knapping can help us not just to make but also to understand stone tools and, ultimately, the people who made them. I would hope that this book will bridge possible gaps between knappers and archaeologists by making knappers aware of the broader archaeological questions which can—and should—be addressed to stone tools and their manufacture. At the same time it should make archaeologists aware of the insights to be gained from trying things out. Perhaps too it will encourage us all to pick up a hammerstone and go to work.

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