EXARC JOURNAL 2016/3
10 Articles | Open Access

Reviewed Article:

Recycled Flint Cores as Teaching Tools: Flintknapping at Archaeological Open-Air Museums

Persistent Identifier: https://exarc.net/ark:/88735/10254

EXARC Journal Issue 2016/3 | **Publication Date:** 2016-08-15

Author(s): Matthew Swieton [1] ✉, Linda Hurcombe [1]

[1] University of Exeter, Archaeology, Laver Building, North Park Road, Exeter, EX4 4QE, United Kingdom.

The OpenArch project provided the ideal opportunities to explore the anthropological nature of contemporary flintknapping skill acquisition within the context of open-air museums. The University of Exeter's involvement in the OpenArch project—the 'Dialogue with Science Roadshow'—was an opportunity for craftspeople and academics to share both practical and theoretical knowledge with one another. Since many of these exchanges had occurred in the

presence of visitors, they served as a unique pedagogical tool in conveying past lifeways to the public.

> “After a contemporary knapper makes an informed decision as to what he/she will manufacture, the issue is then how the knapper will go on to produce the intended artefact.

This article examines the art and craft of flintknapping and how the OpenArch project has influenced the way in which this specialized body of craft-knowledge can be most efficiently presented to the public, but additionally—and more importantly—how making the most of teaching opportunities can convey a deeper interpretation to the museum-goer. OpenArch collaborators from the University of Exeter include both of the authors, Bruce Bradley, and other faculty members/postgraduate students representing the Department of Archaeology. The Department of Archaeology’s involvement at Sagnlandet Lejre, Denmark has led to the further collaboration with two notable commercial flintknappers: Peter Wiking of Wiking Flintworks and Morten Kutschera of Kutschera Crafts.

Raw material selection

The technological process begins at the selection of raw material (Inizan et al. 1999, 25), and in the case of flintknapping the desiderata are not fixed in determining the quality of toolstone. The ability to determine the quality of raw material depends, in part, on the accumulated experience of the flintknapper: It is the ability to make a number of sensory observations to assess the quality of the raw material. The late American lithic technologist Don Crabtree wrote about some of the variables that must be taken into consideration in selecting toolstone. Many of these variables can be assessed visibly (such as color, transparency, luster, or the presence of cortex); some variables must be assessed audibly (dull sounds typically indicate weaknesses, fissures, and cracks); and others assessed kinesthetically, “…the amount of resistance to the necessary force required for detaching a flake” (Crabtree 1967, 9). The difficulty lies not in looking, hearing, or feeling toolstone; rather, it is how the knapper in question can interpret these different streams of data and make an informed interpretation about quality. The nuances of selecting toolstone reveals the intricate set of nested skills within the broader craft of flintknapping, and although a novice flintknapper can learn to interpret the sights—or even sounds—of workable toolstone, only an intermediate/expert knapper can make judgments based on kinesthetically engaging in the raw material.

There is an interesting and unique luxury afforded to researchers and contemporary flintknappers who are interested in the way stone was knapped in antiquity, and it relates to how we select stone in the present. The morphology of the raw material available to a community of knappers (whether they be academic, commercial, recreational, etc.) has the power to dictate what is made (or what particular technology can be practiced). In other words, without having an acculturated mental template to make stone tools coupled with the ever-expansive knowledge we have about human antiquity, contemporary knappers have the luxury of imposing any past mental template onto toolstone that would best suit the quality (and form) of the raw material.

The authors had the opportunity to participate in a specialized flintknapping workshop focused entirely on the Scandinavian Square axes of the Neolithic offered by Peter Wiking of Wiking Flintworks. Selecting quality toolstone for making Neolithic square axes included the observation of aforementioned variables by Crabtree, but the experience also included the shape of the original nodule of flint. Flintknapping, as a craft is, a reductive process; which logically means that a piece of toolstone *smaller* than a potential square axe cannot be a suitable candidate for a Neolithic replication, regardless of how vitreous, isotropic or brittle the toolstone may be. In this sense, quality of the toolstone is partially dependent on the mental template the knapper intends to impose on the stone.

Upon returning to the University of Exeter the authors quickly realised that although the flint exhibited all of the ideal qualities for knapping, the amorphous form in which it occurred made virtually none of the candidates suitable for Neolithic square axe replication (See Figure 1). As stated before, the limits of what can be done with the raw material is established–in part–by the shape of the raw material; so many of the amorphous concavities actually impose themselves onto what the potential axe *would have* been. Perhaps an expert flintknapper could still manage to produce a square axe given the amorphous quality of a given piece of flint, but the finished product would demonstrate one of two qualities:

1. The size of the finished axe would be significantly smaller as a result of trying to utilize an area of the flint not affected by the irregular shape *or*
2. A square axe is produced of the same size with cortical concavities; the material can still be utilized to make an axe, but the restraints imposed by the material shape are visible in the final product

Despite the variations in toolstone form in the University flint we were still able to determine ideal uses of the material by considering different ways flint had been modified in antiquity. Certain amorphous nodules of toolstone could be used to remove core blanks for microblades and, in rare cases, produce blanks for bifacial work. This, again, affords researchers with the unique condition of sifting through the mental templates of prehistoric (and, in some cases, ethnographic) flintknappers to make the most of a non-renewable resource. The possibilities for the use of flint present an interesting observation: The more skilled and knowledgeable a flintknapper is, the more success he/she will experience in selecting an ideal mental template and executing its reduction accordingly.

Beyond toolstone: Tools

After a contemporary knapper makes an informed decision as to *what* he/she will manufacture, the issue is then *how* the knapper will go on to produce the intended artefact. The tools used to modify knappable toolstone require varying sets of specialised information on behalf of the craftsperson to ensure their successful use. Copper implements are notorious in the flintknapping community as tools that do not require as much specialised skill for their use as antler billets, for example. (There has been an interesting discussion as to whether copper had been used to manufacture flint daggers during the Scandinavian Neolithic; see Tanner 2015.) Both copper and antler being categorized as 'soft-hammer' percussors; a category that also extends to soft hammerstones (Crabtree 1967a, 61; Nunn 2007, 57; Patten 1980, 17), wooden billets (Callahan 1979, 24) and even synthetic materials that aim to simulate natural percussors (Callahan 1978, 9). Using synthetic and copper billets —although not archaeologically consistent—can present to the public a conversation on the nature of archaeological experimentation.

Furthermore, hard-hammerstones are used to execute flake removals via direct percussion; but other means of removing flakes are available to knappers. For example, a novice using a copper billet might have more trouble removing qualitatively identical flakes with an antler billet. Likewise, a knapper using an antler billet may have difficulty removing qualitatively identical flakes with a soft-hammerstone. Indirect percussion requires a much more complicated set of kinesthetic information for successful flake removal: The toolstone must be stabilized while one hand is responsible for establishing platform depth and the angle of applied force whereas the other hand swings the percussor that then makes contact with the premeditatedly-placed punch that then removes the flake (Crabtree 1967b, 63).

Knappers can have all sorts of interesting variations on the same technological method of reduction (See Figure 2). The amount of technical understanding required to generate controlled flakes using any method of flake removal has been referred to as 'intuitive mathematics' (Adams 2007, 45). The notion of intuitive mathematics makes researchers look at toolstone as an evolutionary niche: A medium through which an expression of a complex series of controlled flake removals can turn a cortical nodule of flint into, for instance, a dagger of the Scandinavian Neolithic.

In the case of the manufacturing Neolithic square axes, a combination of hard- and soft-hammer percussion prepare the axe preform with most of the technical work being done afterward with indirect percussion. The method of indirect percussion allows the knapper to use a percussor with a punch (typically an antler) to transfer the energy into the toolstone to facilitate flake removals. In the case of direct percussion, there are discrepancies in the sets of kinesthetic information required for their successful implementation.

Obtaining the proper set of flintknapping tools can often be difficult. Antler, for instance, can be rare (and thus, expensive) depending on the species from which the antler is collected. If the knapper needs a soft-hammer percussor, a reasonable substitution for antler would be a soft-hammerstone; but more importantly, explaining *why* the substitution was made–especially during a flintknapping demonstration–helps the visitor understand the role of tool selection and tool use in the technological process. Similar substitutions can be made for antler tines with copper wire–if the goal is to demonstrate pressure flaking, copper can be replaced with antler. However, in these cases it is important to convey that the copper is a contemporary substitute for the same technological goals that would otherwise be achieved with the antler. The visitor not only sees an ancient craft in practice, but they are presented with a deeper discussion about tools and their relationship to making predetermined things.

Bipolar flaking: Implications for archaeological open-air museums (AOAM)

Within the academic spheres there has been debate as to what is meant by 'bipolar flaking' with some researchers arguing the simple placement of a core on a hard anvil, which is then stuck by a large hammerstone (Hardaker 1979, 13; Hayden 1980, 4). Others have proposed more technical conditions–only a fracture caused by compression can produce 'true bipolar fractures' (Patterson 1979, 21). For the intents and purposes of this article, the former definition better suits the discussion for how AOAMs can make the most their flint reserves (if any). In this section, the goal is to consider the nested skill sets that exist in flintknapping to create a pedagogical tool and to foster a new level of communication to museum visitors at open-air museums.

In the summer of 2015, the authors—along with two other PhD students—went to Albersdorf, Germany to collaborate with Archäologisch-Ökologisches Zentrum Albersdorf (AÖZA). When visiting AÖZA, the public audience have the unique opportunity to try their hands at flintknapping under established health and safety guidelines. As a result, however, without either the knowledge or know-how of flintknapping the public produces exhausted flint cores that then go into a large discard pile. These cores can range in size; some of the exhausted cores could be as large as 10cmin diameter. Without any concept of Adams' 'intuitive mathematics' many of the cores reach the threshold of direct percussion (Hiscock 2015, 5). Hiscock discusses the thresholds of cores; when cores are reduced using a particular method (i.e. direct percussion) the knapper runs the risk of exhausting the core. At which point, the knapper is faced with a choice: He/she can either discard the core (as is the case in AÖZA) **or** core treatment can be altered to continue removing flakes (Hiscock 2015, 4).

AOAMs are unique places from the perspective of an archaeological research in that they can provide the ideal conditions to try something new (Paardekooper 2008, 54). Such museums also have the unique chance to convey intangible aspects relating to past lifeways (Hurcombe 2015, 35). Conditions like those at AÖZA allow the implementation of the initially rejected cores to produce a piece (or two pieces, if a discarded core can be successfully split via bipolar percussion by 'true bipolar fracture') the Open-Air museum can convert exhausted cores into learning cores (See Figure 3). Using a bipolar flaking technique to rejuvenate exhausted flint cores provides two distinct advantages: The first relates to the experiential data as it relates to speculative interpretations of archaeological teleoliths (Shea 2015, 242), or the, "...tools novices make to practice knapping." If the bipolar technique is used to produce *practice cores* for the public to try flintknapping, then those cores become teleoliths– these cores become materials made for the sole purpose of learning how to flintknap. (Producing these *teleolith* learning cores in the museum can also help archaeologists speculate about how people learned flintknapping in the past.)

FIG 3. SWIETON DEMONSTRATING THE USE OF BIPOLAR PERCUSSION TO EXTEND THE LIFE OF A CORE AT AÖZA. PHOTO: BIRTE MILLER.

Coupled with the speculative interpretations of archaeological teleolith production is also a pedagogical tool to help students and the public understand the mechanics of conchoidal fracture. After the exhausted core is selected and rejuvenated through bipolar flaking, it becomes–what is known archaeologically as – an amorphous core; a core with no formal morphology (Patterson 1987, 51). These cores become *de facto* teleoliths when presented to contemporary flintknapping novices since they have yet to acquire such formal templates, but still have freedom to explore the toolstone. Although, teaching *and* practice have produced positive results in flintknapping skill acquisition (Bradley and Khreisheh 2015, 59).

More importantly, using bipolar flaking to rejuvenate cores conveys to the public the otherwise intangible process of overcoming 'core thresholds' and, more generally, the extension of object biographies. As Hurcombe (2015, 35) states, taking a tangible *artefact* to a functional *implement* to a *tool* to a *living tool* makes respectively more interpretive steps into a presentation of the intangible, but the rejuvenation of cores allows this interpretation to occur on yet another step. The unique nature of AOAMs allows the presentation of a *process* that extends the use of a discarded item in a dynamic fashion that could not be captured or conveyed properly during a conventional museum experience. This is especially the case if the visitor sees the bipolar flaking take place before them, after which they become responsible for further core reduction.

The unique condition of contemporary knapping: Conclusion

By presenting the public with smaller cores on which they can explore the toolstone—especially after they have witnessed the bipolar flaking—contemporary knapping is used to disseminate the subtle technological decisions between the archaeological materials and the materials reproduced by the public. Since we do, in fact, live in a time and place that has accumulated vast information about how people made stone tools in prehistory, the public's attempts at flintknapping should be framed and presented to them in terms of preexisting technological traditions. ("If you change **X**, then you could produce something that looks like a Paleolithic blade...etc. *or* "Removing flake **Y** would establish the ideal core geometry to create a blade precore.") With this proposed practice of core recycling in Open-Air museums, visitors can engage with prehistory auditorily, visually and kinesthetically whilst appreciating the complexity of object recycling and the archaeological implications for interpretation.

Keywords flint knapping
ancient technology
methods & techniques
teaching

Country United Kingdom

Bibliography

ADAMS, S. 2007. Flintknapping and Intuitive Mathematics. *Bulletin of Primitive Technology*, No.33, pp 43-45.

BRADLEY, B. and KHREISHEH, N. 2015. "Knapping Skill Assessment." In *Archaeology and Crafts: Experiences and Experiments on Traditional Skills and Handicrafts in Archaeological Open-Air Museums in Europe*, edited by Rüdiger Kelm, 54-61. Albersdorf: Husum.

CALLAHAN, E. 1978. Synthetic Billet Material. *Flintknappers' Exchange*, 1(1), pp 9-10.

CALLAHAN, E. 1979. The Basics of Biface Knapping in the Eastern Fluted Point Tradition: A Manual for Flintknappers and Lithic Analysts. *Archaeology of Eastern North America*, 7(1), pp 1-180.

CRABTREE, D. E. 1967a. Notes on Experiments in Flintknapping: 3, The Flintknapper's Raw Materials. *Tebiwa*, 10(1), pp 8-25.

CRABTREE, D. E. 1967b. Notes on Experiments in Flintknapping: 4, Tools Used for Making Flaked Stone Artifacts. *Tebiwa*, 10(1), pp 60-73.

HARDAKER, C. 1979. Dynamics of the Bipolar Technique. *Flintknappers' Exchange*, 2(1), pp 13-16.

HAYDEN, B. 1980. Confusion in the Bipolar World: Bashed Pebbles and Splintered Pieces. *Lithic Technology*, 9(1), pp 2-7.

HISCOCK, P. 2015. Making it Small in the Palaeolithic: bipolar stone-working, miniature artefacts and models of core recycling. *World Archaeology*, 1-12.

HURCOMBE, L. 2015. Tangible and Intangible Knowledge: the Unique Contribution of Archaeological Open-Air Museums. *EXARC*, 2015-No.2, pp 34-36.

NUNN, G. 2007. Using the Soft Hammerstone: The Tool of the West. *Bulletin of Primitive Technology*, No. 34, pp 57-61.

PAARDEKOOPER, R. 2008. The Use of Archaeological Open Air Museums in Archaeology. *Bulletin of Primitive Technology*, No. 35, pp 51-55.

PATTEN, B. 1980. Soft Stone Hammer Percussion. *Flintknappers' Exchange*, 3(1), pp 17-18.

PATTERSON, L. W. 1979. Additional Comments on Bipolar Flaking. *Flintknappers' Exchange*, 2(3), pp 21-22.

PATTERSON, L. W. 1987. Amorphous Cores and Utilized Flakes: A Commentary. *Lithic Technology*, 16(2/3), pp 21-53.

SHEA, J. J. 2015. Making and Using Stone Tools: Advice for Learners and Teachers and Insights for Archaeologists. *Lithic Technology*, 40(3), pp 231-248.

TANNER, G.H.S. 2015. *When Metal Met Stone: Searching for Traces of Metal Tool Utilization During the Production of Late Neolithic Nordic Flint Daggers*. Masters Thesis. Department of Archaeology and Classical Studies: Stockholm University.
https://www.academia.edu/13596600/When_Metal_met_Stone_Searching_for_traces...

Share This Page

Corresponding Author

Matthew Swieton
University of Exeter
Archaeology, Laver Building
North Park Road
Exeter, EX4 4QE
United Kingdom
E-mail Contact

Gallery Image

FIG 1. IRREGULAR NODULES OF FLINT (IN AMOEBA SHAPES) AVAILABLE TO THE AUTHORS IN EXETER COMPARED TO FINISHED AND PARTIALLY PREPARED SQUARE AXES OF DANISH FLINT (MADE BY PETER WIKING AND LINDA HURCOMBE RESPECTIVELY). PHOTO: LINDA HURCOMBE

FIG 2A. DEPICTED ABOVE ARE THREE DIFFERENT CONFIGURATIONS OF INDIRECT PERCUSSION: THE FIRST CONFIGURATION DEPICTS THE PERCUSSOR, PUNCH, AND CORE ALIGNED VERTICALLY. THE SECOND CONFIGURATION DEPICTS THE THREE COMPONENTS HORIZONTALLY. THE LAST CONFIGURATION IS A COMBINATION OF THE TWO. AGAIN, THIS IS SIMPLY TO CONVEY THE IDIOSYNCRATIC NATURE OF FLINTKNAPPING WITHIN ONE COMMON METHOD SUGGESTING THAT THERE ARE MANY DIFFERENT WAYS TO ‘SKIN A CAT’. PHOTO: JERZY SWIETON

FIG 2B. DEPICTED ABOVE ARE THREE DIFFERENT CONFIGURATIONS OF INDIRECT PERCUSSION: THE FIRST CONFIGURATION DEPICTS THE PERCUSSOR, PUNCH, AND CORE ALIGNED VERTICALLY. THE SECOND CONFIGURATION DEPICTS THE THREE COMPONENTS HORIZONTALLY. THE LAST CONFIGURATION IS A COMBINATION OF THE TWO. AGAIN, THIS IS SIMPLY TO CONVEY THE IDIOSYNCRATIC NATURE OF FLINTKNAPPING WITHIN ONE COMMON METHOD SUGGESTING THAT THERE ARE MANY DIFFERENT WAYS TO 'SKIN A CAT'. PHOTO: JERZY SWIETON

FIG 2C. DEPICTED ABOVE ARE THREE DIFFERENT CONFIGURATIONS OF INDIRECT PERCUSSION: THE FIRST CONFIGURATION DEPICTS THE PERCUSSOR, PUNCH, AND CORE ALIGNED VERTICALLY. THE SECOND CONFIGURATION DEPICTS THE THREE COMPONENTS HORIZONTALLY. THE LAST CONFIGURATION IS A COMBINATION OF THE TWO. AGAIN, THIS IS SIMPLY TO CONVEY THE IDIOSYNCRATIC NATURE OF FLINTKNAPPING WITHIN ONE COMMON METHOD SUGGESTING THAT THERE ARE MANY DIFFERENT WAYS TO ‘SKIN A CAT’. PHOTO: JERZY SWIETON

FIG 3. SWIETON DEMONSTRATING THE USE OF BIPOLAR PERCUSSION TO EXTEND THE LIFE OF A CORE AT AÖZA. PHOTO: BIRTE MILLER.