Unreviewed Mixed Matters Article:

Book Review: Recent Publications: Experimental Archaeology in the November 2015 Issue of the Cambridge Archaeological Journal (Volume 25, Issue 4)

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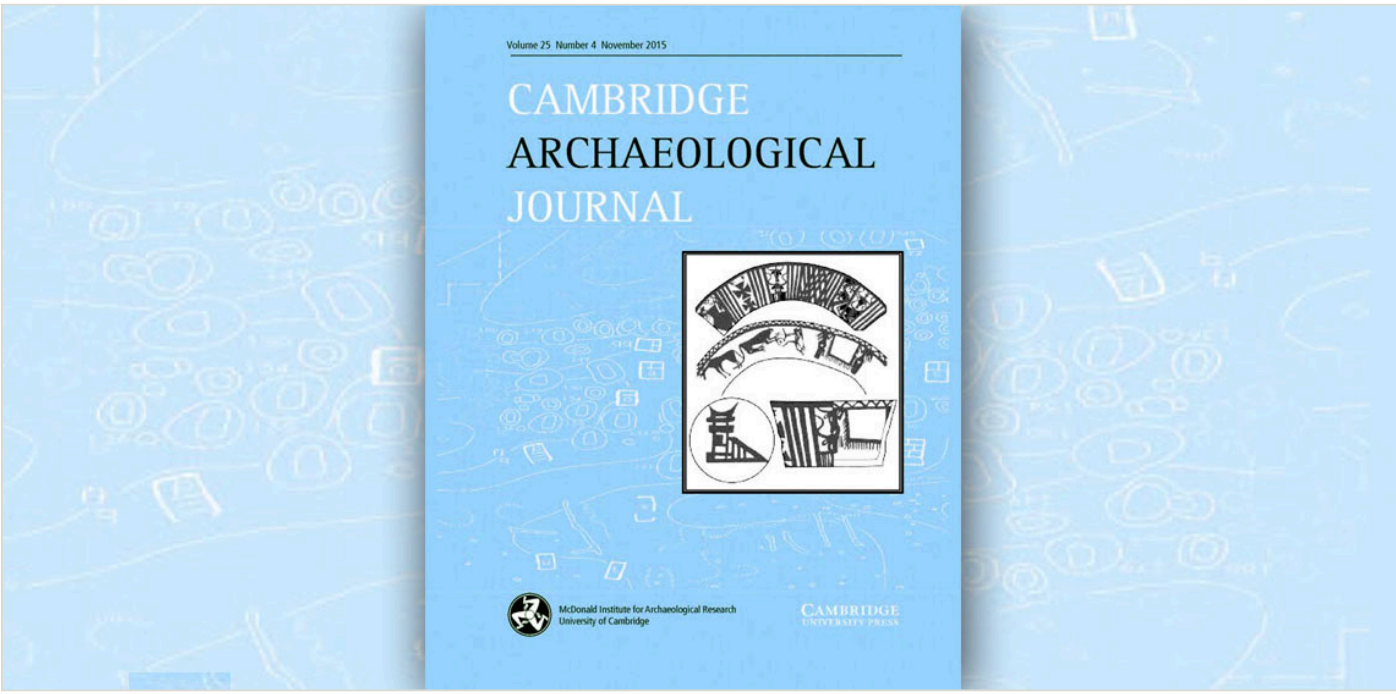

In the last quarter of the 1900s, John Coles (1979) and Peter Reynolds (1999) introduced the subject of experimental archaeology, which has gained significant momentumin the past few years. The discipline has become essential for reconstructing past technologies, in addition to

supporting archaeological theory. For this reason, experimental archaeology has become increasingly popular in academic programmes, with masters and PhDs being offered on the subject at several universities in the United Kingdom, as well as being taught as a study unit within the undergraduate degree programme. These programmes not only provide a hands-on approach for interacting with archaeological material, but also give students grounded knowledge on past technologies.

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Experimental archaeology has grown beyond replicating craft and technology and is now exploring the nature of skill acquisition and learning processes. Questions such as to how people learned skills in the past and how that knowledge was transmitted/communicated, provide new areas in which experimental archaeology can produce essential data. The latest research on this subject is presented in the November issue of the *Cambridge Archaeological Journal*, which explores these facets and opens up new areas of enquiry.

The first article, “Skill Learning and Human Brain Evolution: An Experimental Approach” by Dietrich Stout and Nada Khreisheh, provides an overview of recent studies in experimental archaeology directed at trying to understand how flint knapping is learned. Their study employs a methodology that includes psychology and neuroscience to record the learning process. Using fMRI (Functional magnetic resonance imaging), parts of the brain are examined for changes in blood circulation that indicate areas of neural activation. In other words, by recording brain activity whilst learning knapping skills, the engaged areas of the brain can be located, which in turn might be associated with other acquired skills. For example, it was noted that the prefrontal cortex of the brain was engaged whilst knapping. This is an area associated with higher order cognitive action, which might also be linked to language processing (Vigneau *et al.* 2011).

The article critically examines earlier studies which utilise experimental archaeology to examine skill learning andsummarises these by, recording the length of time it took to learn the skills necessary to successfully reproduce Palaeolithic hand axes. These studies included both verbal instructions (Morgan *et al. 2015)* and non-verbal instructions (Putt *et al.* 2014). In addition the authors describe an interesting study carried out by Hecht *et al.(2014), which* showed how areas of the brain were active and then faded when skills were not frequently practiced. The authors recognise that longer term studies are needed and that this area of research has a rich potential for further work. While this article focusses on the use of technology to record skill learning, it also shows how experimental archaeology has become an essential part of research.

Two other articles, one by April Nowell and another by Francesco d'Errico and William E. Banks are part of the special section; teaching and learning. While these are not specifically based on experimental archaeology, as seen in the article above, understanding the learning process can be a significant part of experimental archaeology. As experimental archaeologists we are not only recreating the tasks, but we are actively engaged in learning techniques that may have been lost, or are at least not commonly learned in modernsocieties. While we seek to replicate the technology and techniques used to create accurate reproductions of artefacts, we cannot replicate the exact conditions or environment in which they were created. For this reason the archaeology of learning can provide essential insights into the processes by which early humans, and even those who lived in later prehistory, learned technological processes and passed that knowledge on to others.

Nowell's article concerns the Upper Palaeolithic children of Southwest France and Northern Spain, incorporating the pictorial culture of the period. In addition to the more familiar cave paintings there are thousands of carved objects, rock carvings, and alsobody art in the form of tattoos and body paint (White 2007). There is also evidence for weaving and textile art (Kvavadze *et al.* 2009; Sofer 2004; Sofer *et al.* 2000).

Examination of paintings and hand prints in caves indicate that children participated in producing art along with adults. Nowell explores how imagery is used to transform the world and how children learn to recognise two-dimensional designs and to understand them as representations of three-dimensional objects. The fourth-dimension is also explored in the form of objects that move or have the semblance of motion. Examples of the latter form of art come in the form of images animated by flickering fire to optical toys known as rondels or thaumatropes. These are perforated discs with an image on either side. When suspended on strings and pulled rapidly, the images create the semblance of motion. One example given shows a deer-like animal that appears to jump(Azèma and Riviére 2012, 322). Understanding the learning and recognition process of two- and three-dimensional representations helps us understand how early humans were able to hold an image in the mind while creating objects, resulting in new ways of seeing and interacting with the world.

The "Archaeology of Teaching: A conceptual framework" looks at the origins of cultural transmission and how to recognise it in the archaeological record. Francesco D'Errico and William Banks break down the learning process into a framework of spatial, temporal and social dimensions. For example the spatial category consists of eight elements, the first of which is learning from a distance, whereby the learning process occurs when observed from a distance far enough removed that the practitioner is not aware of being observed. The steps proceeding describe the proximity along with the increased interaction of the participants in the teaching/learning process. The final element consists of an explanation in the absence of direct observation of action, in which the teaching is not transmitted directly, but instead is given in a coded form, such as writing or mathematics. The temporal dimension acknowledges that learning takes time and follows a similar process to the spatial dimension, in which teaching is done in increasingly larger sequences until finally the process is also delivered in a coded form. The final dimension is social, in which the first level of learning and teaching takes place between those of the same generation and becomes more complex as the relationship spans generations.In the article the authors include the knapping strategy of the Oldowan stone tool industry, the manufacture of horn cores, the use of bone fragments as digging tools and the application of Aurignacian and early Upper Palaeolithic personal ornaments as case studies.

Using the systematic template created for the learning processes, the examples utilised can be fitted into the categories of spatial, temporal and social dimensions. Therefore, stone tool making could be learned by observation, but was more likely to be learned through gesture moulding whereby the teacher guides the hands of the one learning, or by having details of the actions described verbally. The framework could be applied to studies such as those carried out by Tostevin (2012), where he explored the process of learning flint knapping through experiment and reconstruction of debitage.

The authors invite others to apply the framework that they developed for learning dimensions.. Here experimental archaeology could benefit from the systematic observations of the teaching/learning process. Could a skill be learned from observing from a distance, or even close-up but without verbal guidance? Such exercises could enhance the experimental process and add to the subject of how knowledge could have been transmitted.

This issue also contains reviews of recent publications on material culture theory and other articles about early lithic technology, along with learning theory.

The articles reviewed are available through *Cambridge Archaeological Journal* Volume 25, Issue 04 (November 2015) http://journals.cambridge.org/action/displayJournal?jid=CAJ or Cambridge University Press, UPH, Shaftesbury Road, Cambridge, CB2 8BS United Kingdom

Book information:

Skill Learning and Human Brain Evolution: An Experimental Approach by Dietrich Stout & Nada Khreisheh. pp 867 – 875 DOI: 10.1017/S0959774315000359.

Learning to See and Seeing to Learn: Children, Communities of Practice and Pleistocene Visual Cultures by April Nowell. pp 889 – 899 DOI: 10.1017/S0959774315000360.

The Archaeology of Teaching: A Conceptual Framework by Francesco d'Errico & William E. Banks. pp 859 – 866 DOI: 10.1017/S0959774315000384.

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