

CHAPTER 6

EXPERIMENTAL ARCHAEOLOGY: BENEFITS AND ARCHAEOLOGICAL LIMITATIONS

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Abstract

The attempt to reproduce objects related to the material culture of past societies or even practices that took place in them through experimental processes is a field that has contributed significantly to archaeological thinking. The initial origins of experimental studies can be traced back to the 19th and early decades of the 20th century, while the first attempts to focus on the importance of experimental archaeology date back to shortly after the mid-20th century. Nowadays, current research activity, within the framework of interdisciplinarity, considers experimental protocols an integral part of its work, as they can provide further evidence on various archaeological issues but also reconstruct, to a certain extent, phenomena belonging to past societies. It is worth noting that the application of experimental methods is inextricably linked to both archaeological theory and ethnography.

Analogy in archaeology

The use of analogies is a common and generalized practice, even in modern archaeological science, and involves the process of comparison or a rather comparative point of view. The more simplistic, coherent, yet widely accepted definition of analogy indicates a similar event observed and recorded in the present, leading to contemporary observations of a past phenomenon or practice (Ascher, 1961; Morwood, 1975). Archaeologists, in their attempt to decipher more comprehensive issues and straightforward questions, resort to the use of analogies in order to gain a more diverse view and broaden their interpretive palette. Research from other disciplines, such as ethnography, folklore, and anthropology, can also serve as sources of analogies.

Of course, the use of analogy, and its related subject of homology, before being applied to archaeology, first appeared in disciplines such as philosophy, mathematics, and evolutionary biology. These disciplines, as is widely known, have, to varying degrees, influenced and shaped, both in the past and in modern times, tendencies in archaeological science (Trigger, 1989). Concerning analogy, it is now accepted that there is no single kind of analogy but that it can be categorized according to the needs it serves. The type of analogy most used is that of the 'single analogy.' As is evident from the aggressive definition, the term refers to a comparison between two pairs/cases, while some subcategories of individual analogies are known as 'numerical,' 'percentage,' or 'proportional' analogies (Lloyd, 1966; Shelley, 1999: 581). Analogies, in addition to the other disciplines, are widely used, as mentioned above, in cognitive science, which in turn influenced archaeological studies. Similarly, the concepts of analogy and homology, excluding their Pythagorean and Aristotelian origins, were also inextricably linked to the movement of evolutionists such as Darwin, a movement which inspired the pioneers of the 'New' Archaeology (Lloyd, 1966).

With respect to the emergence of analogies in archaeological studies, it seems that their first confirmed application in archaeological contexts dates to the end of the 19th century in the field of interdisciplinary research of prehistoric stone tools, while over the decades, their implementation became more established (Morwood, 1975; Grayson, 1983). However, the utilization of this conceptual framework has diminished to some extent after the 1970s, as the notion of analogy in the service of archaeological science was heavily criticized.

The prejudice against the use of analogy in archaeology

A notable criticism was made of analogies employed in studies involving cross-cultural comparisons since, according to critics, they deprive interpretation of the particular cultural characteristics of each 'sample' and lead to sterile generalizations (Spencer, 1992: 163-164). One such example of a researcher is Gould, who strongly criticized analogy. In contrast, later researchers, such as Shelley and Wylie, considered the reason for criticism of analogy to be its ineffective use by scientists, avoiding invalidat-

ing the value of the concept itself (Wylie, 1982; Shelley, 1999: 580-598). Likewise, although the leading opponents of the above conceptual definitions are considered post-processual archaeologists, one of the most fundamental processual archaeologists, Lewis Binford, was also skeptical about their effectiveness. In particular, he argued, the analogy could trigger some interesting research questions but needed to be adequately explored (Binford 1967: 235, 1993). Nevertheless, he extensively used the analogy in his work, associated with deductive reasoning in archaeology, of which he was a proponent. Indeed, these concepts influenced his study of regularities in past societies (Binford, 1967; Morwood, 1975).

The use of analogy as an interpretative tool in archaeological research has been particularly strongly criticized by the pioneers of post-processual archaeology, such as Ian Hodder, Michael Shanks, and Christopher Tilley. These scholars believed that analogies were contracted to a procedural approach to archaeological science (Hodder, 1986; Shanks and Tilley, 1988). They also argued that analogies detached the phenomenon or object from its 'historical' context and archaeological characteristics, thus removing its 'uniqueness.' Ultimately, even Hodder accepted that analogies are necessary, especially for objects or phenomena associated with prehistoric societies and cultures. Of course, he went on to argue that they had to be treated in a different way than procedural archaeologists did (Hodder, 1986). Finally, unlike the post-proceduralists, who opposed the use of analogies, there were scholars, such as Colin Renfrew, who, wanting to study broader archaeological issues, felt that using analogies was inevitable (Renfrew and Cooke, 1979).

Beyond the viewpoint mentioned above, some researchers took a more moderate stance and tried to apply this conceptual framework by suggesting modifications or pointing out the limitations of the research. One such example was Spencer, who, in his attempt to investigate the origins of Mesoamerican cultures, argued that the use of analogies and homologies in combination with archaeological-historical contexts, despite the "evolutionist" echoes, can offer a broader view of the past phenomena being studied (Spencer 1990, 1992). Equally, Heider, in his research, pointed out that the use of a single, analogous paradigm, primarily through ethnoarchaeological research, can lead to a misleading picture of past societies. At the same time, however, he advocated using models or interpretive frameworks when they are based on multiple parallels or analogies (Heider, 1967). The latter's view was considered correct by researchers such as

Shelley, who pointed out the absence from Heider's text of any example studied under the above methodological-interpretative approach (Shelley, 1999).

Nevertheless, Shelley, taking his cue from Heider's work, attempted to demonstrate that the theory of 'multiple analogies' could be applied by analyzing in his work a multitude of archaeological objects that were interpretable through this theoretical research background (Shelley, 1999). Similarly, in his introduction to an article discussing the investigation of cutting traces through experiments, Dominguez-Rodrigo points to analogy as a non-objective entity involving a series of assumptions and syllogisms. The hypotheses-conclusions, according to him, are partly chosen by the researcher, pointing to the existence of a dialectical dynamic between the ideas under investigation and the way they are ultimately explored. In this context, he elaborates that the proper use of analogies implies a high degree of comparison between experiment and archaeological data and that any research derives its scientificity from the conceptual presuppositions it sets a priori (Dominguez-Rodrigo, 2005). Seetah has a similar perception, arguing that analogies are helpful in 'experimental contexts,' but analogies without experimentation are finite and limited (Seetah, 2008).

Defining experimental archaeology

Experimental archaeology is a specialized discipline of archaeological research that applies a variety of methods, techniques, analyses, and perspectives within a controlled imitative experimental framework that seeks to approach past phenomena in an attempt to generate and test hypotheses, as well as to provide or enrich analogies in support of archaeological interpretation (Mathieu, 2002).

As evident from the above definition, experimentation is vital to this research field. Experimentation in the sciences is seen as part of a hypothetical-conceptual process, as Outram underlines in his introductory article for issue 40 of the scientific journal *World Archaeology*, reiterating a view of the Austrian philosopher Popper. Therefore, a hypothesis is formulated at the outset of this operation, which is then tested as to its correctness, resulting in its confirmation or refutation. If the first possibility is genuine, the hypothesis can be considered valid, but this does not exclude the possibility

of its validity being questioned in the future (Popper, 1959; Outram, 2008). Likewise, according to Seetah, experimentation involves the feasibility of testing. It contributes to developing appropriate research designs, with their principal characteristic being repeatability, thus making them suitable for answering research questions (Seetah, 2008). Furthermore, another term of experimental archaeology that is worth analyzing is that of ‘actualism.’ The ‘actualistic approach’ has been associated as a term and method with the proponents of New Archaeology, while Binford, in his work, identifies it as essential to archaeological research (Binford, 1981). As a terminology, it is also found in other disciplines, such as geology, ethnography, and anthropology, by describing the studies of phenomena that occur in real-world settings rather than as the aftermath of laboratory experiments. Often, the ‘actualistic approach’ is interpreted as a modern form of homomorphism and recommends that the processes that took place in the past are the same as those in the present but are being operated at different degrees and frequencies (Gould, 1987).

In addition to the three fundamental concepts and definitions mentioned above, the terms independent variable, dependent variable, and fixed parameter are significant. All of them are on loan from the natural sciences, and their existence is crucial for a correct experimental approach to be considered proper. According to the study hypothesis, the main subject under investigation is the dependent variables. In contrast, the independent variables consist of the factors that are not being explored but affect the dependent variables. More precisely, independent variables are defined as the causes or situations the researcher manipulates or identifies to ascertain a process’s results. Fixed parameters are elements not being altered in an experiment (Christidou, 2013).

Integrating experimental approaches in archaeological studies

Turning attention to issues beyond terminology or borrowings from other disciplines, however, by referring to literature from the last few decades, it becomes clear that experimental methods have been fully integrated into archaeological research since the

1960s (Seetah 2008: 135). Over the years, studies have attempted to summarize what has been implemented in the discipline and grouped experimental methods and research into categories (Ingersoll et al., 1977; Coles, 1979). More recent volumes, such as those by Mathieu (2002) or Ferguson (2010), also try, through the presentation of studies addressing different research questions, to redefine the role of experimental archaeology, set experimental protocols, but also to broaden the scope of its implementation. More specifically, Mathieu, based on his definition of experimental archaeology, argued that an essential component of research in the field is the control of variables, although this can vary correspondingly. Also, the concept of replication is of great significance, as, in essence, phenomena are reproduced in a potentially controlled environment to generate and test hypotheses with the ultimate goal of generating analogies that will aid archaeological interpretation (Mathieu, 2002). Similarly, Outram, in his preface to the issue of *World Archaeology* devoted to experimental archaeology, vigorously defends its value, considering that it can offer the most to contemporary archaeological research. Moreover, he believed that the obstacles created by the influence of post-processual archaeological thinking must be overcome (Outram, 2008).

One researcher who has strongly advised using experiments to understand the past better and has made some categorizations is Peter John Reynolds (Reynolds 1974, 1979, and 1994). He emphasized the value of studies conducted in research centers in England and the Scandinavian countries and grouped this type of research into five main topics. More precisely, according to Reynolds, experimental studies can be separated into studies of constructions (buildings), those related to the production process and use (creation of ceramics, tools, kilns, etc.), simulation tests, probability experiments, and projects of technological novelty or innovation. Despite his attempt to group them, he points out that there are no clear boundaries between the various categories and highlights that they are intertwined and complementary (Reynolds, 1999: 393). Furthermore, a fundamental notion in his work is that experimentation can pioneer new directions in archaeological interpretation. It is a pivotal way to challenge, overturn, and verify theories, meanings, and hypotheses.

Equally, he points out that without experimentation, archaeology will be dominated by sterile reformulations and typological classifications (Reynolds 1994: 14, 1999: 394). Outram, in contrast to the theme-based grouping proposed by Reynolds, without rejecting it and classifying it as one of the most acceptable, separates the meth-

ods differently. More specifically, he groups experimental approaches into those in a well-controlled laboratory environment and those in conditions similar to those of the past by using raw materials identical to those found in archaeological contexts. However, he also underlines that both categories are necessary and complementary (Outram, 2008).

Conversely, Mathieu (2002) developed a “hierarchical” classification of experimental methods. His main criterion was the range of the subject that each study was trying to investigate. He, therefore, formed his groupings using the following calibration criteria: objects, behaviors, processes, and systems. Consequently, he considers that these four broad clusters can be further subdivided. Things can be divided into visual and utilitarian replicas, where the former are for learning purposes. At the same time, the latter is used to function like the archaeological artifacts on which their construction was based. The behavior-related experiments are divided into functional, comparative, and phenomenological studies. Utilitarian experiments are the most frequent, involving the control of using a specific category of objects in one particular case-study context. Comparative experimental studies entail the analysis of several functional studies. At the same time, phenomenological investigations describe the attempt to explore sensory perceptions by reproducing what a subject felt, perceived, or sensed. However, these kinds of sensory studies are not, in many ways, counted among archaeological studies.

Correspondingly, Mathieu divides process-related experiments into those investigating formation processes, such as how archaeological deposits are created, and those dealing with simulation studies. The only category not grouped further is that of examinations that involve the assessment of social systems and essentially involve the study of multiple communal processes. Finally, a critical view of his effort to categorize the experimental approaches leads to the assumption that these groups are unclear and do not constitute norms that can be followed with absoluteness (Mathieu, 2002).

Concerning Greek literature, only recently, a similar attempt to categorize the experiments was made by Christidou (2013), dividing studies in the field of experimental archaeology into three categories; those that analyze contemporary examples in order to trace them back to past societies, those that are combined with ‘actualistic research’ and especially ethnography, and those that relate to natural processes and non-anthropogenic activities. A common feature among the subcategories is the a

priori knowledge of the phenomenon being analyzed and the result that is eventually confirmed or disproved. However, following the researchers' caution, as mentioned earlier, Christidou also points out that her triadic categorization is not absolute and is open to criticism (Christidou 2013: 15).

Discussion

The main benefits of experimental approaches could be summarized, as made evident through the various studies so far. These constructive features comprise the observation under controlled conditions of specific variables, the methodological scientificity by applying a particular protocol, the prospect of repeatability, the variation of parameters in case of experimental repetition, and the production of both qualitative and quantitative data, depending on the method adopted (Reynolds 1994: 2, Seetah 2008: 135, Christidou 2013: 14, 19). Furthermore, the precise formulation of the research questions should be highlighted beforehand by defining possible outcomes and systematic errors (Christidou 2013: 14). Similarly, regarding the experimental outcomes in this kind of research, all the generated results should be assessed as part of the explanatory narrative even when they are not compatible with the broader idea that the researcher would like to present initially (Reynolds 1994: 2). Moreover, the experimental results should be considered as only a part of a range of probabilities (Wylie, 1982).

Therefore, contemporary researchers seek to combine theoretical interpretive tools, modern analogies, and experimental methodologies that can be replicated while believing that theoretical manifestations and perspectives can be derived from experimental processes. Eventually, all phenomena studied must be interpreted in the light of social and technological forms so that scholars do not limit themselves to simply repeating and reconstructing 'traces' found within archaeological remains (Seetah, 2008).

Despite its numerous merits, like any trend in archaeology, experimentalism has been criticized for going beyond the theoretical framework of analogy. The criticism has been made by scholars who either do not view the results of this type of study with any credibility or who still need to believe in the existence of a separate discipline that should be called experimental archaeology. For this group of scholars, experimental protocols

combined with other archaeological and non-archaeological methods are sufficient to approach broader phenomena without being able to focus on the individual characteristics of each archaeological paradigm they are trying to interpret (Pelegrin, 1998; Christidou 2013: 19). Moreover, Christidou underlines that experimentation was overestimated in the 1960s and 1970s due to the theoretical approaches of the time, which favored positivism and did not recognize the multidimensional character of archaeological deposits and the material culture of past societies. It also questions the interpretive capacity of many researchers who conducted such studies (Christidou, 2013). Still, many researchers applying the methods discussed above highlight the lack of standardization and the absence of common terminology, at least in experimental protocols investigating similar questions, and point out that many studies in the past did not consider the experience of the person conducting each experiment (Seetah, 2008). The overhead view on the absence of skilled scholars in some studies is reinforced by Outram, who highlights the inherent dangers. His remarks are related to the relatively vague objectives, the lack of a detailed description of the materials and methods used, the 'trade-offs' affecting the hypothesis being tested, the inappropriate variables-parameters, and the incomplete academic documentation (Dominguez-Rodrigo, 2005; Outram, 2008).

In any case, selecting experimental archaeology to a holistic interpretive approach is essential. Despite the difficulties and limitations, it gives the researcher the opportunity for an experiential and sensory analysis of archaeological data, particularly in matters of technological expertise. Through a comprehensive exploration of all the various stages of an experiment, the researcher becomes an active member of the interpretative process, approaching the data not from a distance but from the perspective of the active subject.

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