



The handaxe reloaded: A morphometric reassessment of Acheulian and Middle Paleolithic handaxes

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ABSTRACT

This paper examines shape and size variability in Mousterian of Acheulian Tradition (MTA) handaxes and compares the observed patterns to those in the Lower Paleolithic Acheulian, both to better understand variability in MTA handaxes and to test whether or not this variability, particularly as it relates to resharpening and reduction, is structured similarly to that in the Acheulian. The Acheulian data set is based on previously published data with the addition here of a study of the handaxes from the site of Boxgrove, England. The MTA data set is based on four classic sites from southwest France with large handaxe collections. Both standard caliper-based morphometrics and Elliptical Fourier Analysis applied to coordinate data taken from digitized images of handaxes are used to assess shape. The result is that, contrary to expectations based on assumptions of evolving technological skill, handaxes in the MTA are as or more variable in shape than Acheulian ones. This variation is allometric in Acheulian handaxes, and is linked to resharpening from the tip down to the base, but is not related to size in the MTA samples. These results suggest that the goals and constraints of handaxe manufacture, but particularly handaxe reduction as a result of reworking during use, were quite different in the MTA and Acheulian, implying that conclusions about hominin cognition drawn from patterns in shape variability in handaxes must be understood in the context of artifact life histories.

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Introduction

The handaxe is one of the most studied Paleolithic tool types. It is generally defined as a core-tool shaped on two main planes that intersect at the edges – making the handaxe by default a *bi*-facial tool. Used as an index fossil since the very earliest discoveries, and seen as an indicator of various cognitive abilities of hominins, the handaxe has been at the center of a number of important debates and has fueled many methodological advances in the field of lithic analysis. Handaxes are the first tools made by form-shaping (Fr. *façon-nage*, Ger. *Formüberarbeitung*), and, as such, have been considered to reflect the decisions and intentions of prehistoric hominins more so than other tool types in the Lower and Middle Paleolithic. They are also frequently considered to imply time-investment, mental templates, aesthetics, and cultural standards – though these implications are more frequently simply claimed than empirically tested. Yet, more than 200 years since Frere's (1800) first recorded discovery of a handaxe, there is still much debate about “what” handaxes *really* were. One approach to understanding what handaxes might have

been is to better document and explain the variability we observe in handaxe shape and size. Thus, the focus of the present paper is a quantitative study of variability in handaxes from the western European Middle Paleolithic (MP) and specifically the Mousterian of Acheulian Tradition (MTA). Patterning in this variability is placed in the context of what is already known from the Acheulian with the addition here of new data from the site of Boxgrove (England).

The presence of handaxes in the Middle Paleolithic (MP), and especially in late MP contexts, has been seen as problematic for cultural-evolutionary schemes from the very beginning. De Mortillet's original classification of Paleolithic industries acknowledged the presence of handaxes in both the Middle and the Lower Paleolithic, but designated this tool type as the index fossil only for the Lower Paleolithic (i.e., “Chellean”; de Mortillet, 1872). It was he who also introduced the idea of visible technological progress, evident in the increased standardization and perfection of handaxes from the Chellean to the Mousterian, an idea which has persisted to this day (cf. Monnier, 2006, and references therein). This view was later reworked and reinforced by Commont (1913). However, combining the prevalent paradigm of unilinear cultural evolution with the occurrence of handaxes in *some but not all* MP contexts was uncomfortable. Starting in the 1920s, Denis Peyrony

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and Henri Breuil began to explain these patterns as the result of contemporaneous, dual cultural “phyla” (Peyrony, 1920, 1934; Breuil and Kozłowski, 1931). Moreover, the handaxes from the Middle Paleolithic were presumed to be the result of a cultural filiation with those from the (“Upper”) Acheulian (e.g., as described by Commont [1909] at St-Acheul). From the 1950s to the 1980s, Bordes (1953, 1961) was instrumental in doing away with the notion of unilinear evolution, by introducing the concept of “bushy” or “branching” evolution (Fr. *évolution buissonnante*), which relied on a classification system based on the presence or absence of hierarchical criteria. Despite this paradigm shift in systematics, the fundamental dichotomy offered by the presence or absence of handaxes remained central to Bordes’ understanding of the Paleolithic. In his classification of Mousterian “cultures,” the notion of filiation between the Acheulian and the Mousterian of Acheulian Tradition (MTA) was frequently espoused.

The MTA is confined largely to southwest France (Soressi, 2002) and is characterized by the presence of handaxes, variable but generally low percentages of scrapers, sometimes high percentages of denticulates, and by the presence of backed knives. MTA handaxes are said to differ from Acheulian handaxes in a number of ways. First, whereas Acheulian handaxes show a range of shapes and sizes including large, pointed forms, MTA handaxes are most often restricted to cordiform, subcordiform, and triangular shapes. Some of this reduction of variation may be due to their being made on flake blanks with limited size and shape possibilities rather than on blocks reduced by direct bifacial shaping. Second, though this judgement is quite subjective, MTA handaxes are considered to be “better made.” What this generally means is that the edges are more regular, the shape is more standardized, and the refinement (length/width) is higher, although quantitative data supporting these patterns is limited. Third, in a restudy of several classic MTA assemblages, Soressi (2002) identified distinctive retouch patterns on MTA handaxes, which she argued are the result of functional requirements.

The link between the Acheulian and the MTA can be questioned first of all on chronological grounds. The stratigraphically late position of the MTA within the MP has been repeatedly argued by Mellars and others (e.g., Mellars, 1996, and references therein). As reviewed by Soressi (2002), the oldest dates for the MTA of southwest France comes from TL measurements on heated sediment in Level C of Grotte XVI ($64,600 \pm 3100$ ka; Guibert et al., 1999). These dates are substantially older than the next oldest MTA but more importantly substantially younger than the Acheulian (which dates at the latest about 300 ka). New radiometric dates from classic sites such as Pech de l’Azé I (e.g., Soressi et al., 2007) and more recently discovered sites such as Chez-Pinaud Jonzac (Jaubert et al., 2008) continue to support a late position of the MTA within the Middle Paleolithic. In this light, it seems most likely that handaxes were “reinvented” in the late Middle Paleolithic, almost 200 k.yr. after the end of the Acheulian. From a pure technological point of view, this does not mean, however, that bifacially flaked pieces disappear between MIS 9 and MIS 4, as Monnier (2006) correctly pointed out.

However, the technological attribute “bifacial” is too broad to allow for the proper investigation of the question at hand. Regionally, there are other Middle Paleolithic (chronologically roughly after ca. 300 ka) industries which rely on form-shaping to produce their tools, although these tools are not, strictly speaking, handaxes, and they occur mainly in regions where the Acheulian did not have a strong presence (for recent discussions of the relationships between the West and Central-East European bifacial industries in the Middle Paleolithic, see Richter, 1997; Soressi, 2002; Jöris, 2004, 2006; Iovita, 2009). Even restricting the discussion to Western Europe, “bifacially flaked” implements occur in Charentian

assemblages (e.g., Bordes, 1961). Although not common, and by no means ubiquitous, these are nevertheless present in the form of bifacial scrapers in several French assemblages classified as belonging to the Quina Mousterian, such as La Quina (Debénath et al., 1992) and Jonzac in the Charente (Debénath et al., 1992; Airvaux and Bouchet, 1999), and a few other less-known sites from central France, such as La Fontaine (Airvaux and Chollet, 1975), Abri Reignoux, Mazerolles (Primault, 2003), Hauteroche (Bordes, 1961), and Mas Viel (Jaubert, 2001). In summary, what this means is that the technological knowledge of form-shaping tools was not lost between the Lower and the Middle Paleolithic, but that handaxes *per se* seem to have indeed gone away and then reappeared.

The question then arises, when the handaxe returns late in the Middle Paleolithic is it still the same Acheulian handaxe, and, if not, how does it differ from its predecessor? Did late Middle Paleolithic Neandertals “reinvent” the “same” handaxe, only smaller, more standardized, and more often made on flakes? Or were MTA handaxes used and, in consequence of this different use, maintained/curated in quite different ways from Acheulian handaxes despite the technological and morphological similarities between the two?

This particular issue is addressed here by comparing the way in which Acheulian and MTA handaxes were manufactured and resharpened before discard. This work is based on the assumption that at an assemblage scale, the final form an object takes when it enters the archaeological record can be used to reconstruct the last stages of manufacture and maintenance. It is further based on the assumption that size, therefore, reflects the intensity of reduction (i.e., the “reduction thesis”; *sensu* Frison, 1974; Dibble, 1987, 1995; Shott, 1989, 1995, 1996a,b; McPherron, 1995, 1999, 2003; Hiscock, 1996; Hiscock and Attenbrow, 2003; Shott and Weedman, 2007; Shott et al., 2008). Though this assumption is standard in lithic analysis (e.g., smaller cores are considered to be more heavily worked), it was also almost certainly violated to varying degrees in most handaxes assemblages as nodules and flake blanks will vary in their initial size. Departure from this assumption can be difficult to independently test with handaxes, as most frequently there is no good measure of initial blank size. This is especially true of the handaxes considered here, which tend to be worked around their entire edge and have very little cortex remaining on either face. While it might be possible to qualitatively assess blank size and morphology in some instances, an inability to apply this across all handaxes in the sample presented here and to actually quantify it limits its utility. Here, however, we emphasize that this assumption is being made at the assemblage level, meaning that large handaxes should, on average, belong to the early stages of reduction, and smaller ones, again, on average, to the later stages. Tracking shape changes as a function of size allows us then to create a quantitative proxy for the temporal changes a theoretical aggregate idealized handaxe might have undergone. Furthermore, since resharpening is incremental, and since it is most often applied to the active part of the tool, the changes in shape due to resharpening should indirectly reflect functional constraints exclusively, barring the existence of other constraints on shape, such as those imposed by cultural norms. More specifically, if handaxe function differed between Acheulian and MTA times, then we might expect to find that these tools were manufactured and maintained, through resharpening, in different ways, leaving behind different reduction “ontogenetic trajectories.” Conversely, if handaxe shape were critical for functional or perhaps for aesthetic or cultural reasons, then we would expect that manufacture and maintenance techniques should not influence shape as the process of reduction continues. In accordance with this latter model, we would then expect to find that shape is relatively better conserved and unrelated to size than in the previous model. These are testable propositions that will at

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