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Another Mousterian Debate? Bordian facies, *chaîne opératoire* technocomplexes, and patterns of lithic variability in the western European Middle and Upper Pleistocene

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ABSTRACT

The classic Mousterian Debate of the 1970s has recently been revived, as researchers propose cultural, functional, and chronological interpretations for the Mousterian "technocomplexes". These interpretations, however, are likely to lead to the same impasse that was previously reached forty years ago. The root cause of the problem is analyzing assemblages according to taxonomic units, whether they are Bordian facies or *chaîne opératoire* technocomplexes, which conflate as well as mask multiple sources of variability. In this paper, we use a database of well-excavated, well-dated sites from the Middle and Upper Pleistocene in western Europe to track changes in key lithic variables through time. We show that the chronological patterning of typological and technological facies yields little information useful for elucidating the causes of Mousterian variability. When individual lithic variables from within assemblages are plotted through time, however, new patterns of variability emerge. Our results show that bifaces are not characteristic only of the "Acheulean" and the "Mousterian of Acheulean Tradition." They occur continuously and in low frequencies across the European landscape from MIS 14 onwards. Second, we reveal chronological patterning in Levallois technology, which reaches a height of popularity between MIS 6–4. In the future, more progress in understanding technological behavior during the Paleolithic will be made if we compare the properties of the lithics themselves across assemblages, rather than comparing assemblage types.

1. Introduction

Stone tools are a rich data set with which Paleolithic archaeologists can reconstruct past human adaptations, behavior, and patterns of culture change. Because stone tools preserve many features of their manufacture, their study can help us reconstruct physical behaviors and cognitive abilities. Lithic analysis can also lead to insights regarding human interaction with the environment, such as subsistence, economy, and mobility. Finally, stone tool research can help us understand cultural processes such as learning and the transmission of tool manufacture traditions. A prerequisite for the study of most of these questions is the classification of lithic objects into types, and of assemblages into larger units. These units have variously been referred to as "cultures," "facies," "traditions," "industries," "technocomplexes," and the like. Although the classification of archaeological entities into these units, known as systematics, is one of the fundamental tasks of archaeology, it has proven to be an extremely difficult and contentious one for stone tool assemblages of the Lower and Middle Paleolithic (see also Shea, 2014). The classic 'Mousterian Debate' surrounding the interpretation of François Bordes' Mousterian facies is a case in point.

There are many reasons why Paleolithic systematics have been contentious, some of which reflect the nature of the archaeological record from this time period, which is dominated by one class of material culture (stone), and which is characterized by extremely coarse temporal resolution, in which a single assemblage often spans thousands of years. Other reasons for these difficulties are more epistemological in nature, reflecting different research traditions and goals. Despite over 100 years of research, however, Lower and Middle Paleolithic systematics are still far from being settled. In this paper we begin by tracing the history of Lower and Middle Paleolithic systematics in France, a country which has a long and influential research tradition in this field, to better understand the current state of systematics in Paleolithic research. We then argue that the French technological approach to interpreting lithic data sets, known as *chaîne opératoire*, has generated a large number of Paleolithic industrial units that are poorly suited to evaluating

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chronological patterning or questions of human behavioral adaptations. Finally, we show that an examination of trends among stone tool variables independent of industrial unit types reveals new patterns which deserve further exploration.

1.1. A brief history of French Paleolithic systematics: from de Mortillet through Bordes

The history of French Paleolithic systematics has been described in detail in previous publications (Sackett, 1981, 1991; Groenen, 1994; Monnier, 2006a). Our aim here, therefore, is to provide a brief summary of this history, highlighting the most relevant personalities and the paradigms which guided their approaches. In the late 19th century, the earliest attempt at classifying the French Paleolithic was made by Gabriel de Mortillet, who divided it into a number of epochs, each characterized by a certain tool "industry," fauna, and climate (de Mortillet, 1873). His emphasis on the gradual, continuous, and unilinear evolution of culture reflects the influence of the paradigm of cultural evolution and progressive technological development at the time (Trigger, 1996; Monnier, 2006a). His classification still forms the basis for the classification scheme we use today, although it was subsequently revised many times. In the early 1900s, it was revised by Victor Commont, a prehistorian who carefully documented the river-terrace sequence of the Somme Valley in northern France, and the sequence of lithic industrial types within it. As part of this revision, he introduced Levallois technology as the index fossil of the Mousterian, and argued that it gradually replaced bifaces, which were characteristic of earlier periods, during the Mousterian (Commont, 1913). Even more so than de Mortillet, he emphasized continuity and gradual evolution from one period to the next.

Excavating in southwestern France in the early 20th century, Denis Peyrony concluded that the stratigraphic sequences at La Ferrassie and Le Moustier showed that biface-bearing and non-biface bearing assemblages are contemporary. Since this conclusion was incompatible with the unilinear scheme developed by de Mortillet and Commont, he proposed the existence of dual phyla during the Mousterian, which he defined as Classical Mousterian and Mousterian of Acheulean Tradition (Peyrony, 1920). Adopting a geographically and temporally broader perspective, Henri Breuil similarly proposed that the entire Lower and Middle Paleolithic of western Europe could be divided into two separate phyla, on the basis of the presence or absence of bifaces (Breuil, 1932b). Peyrony and Breuil's shift from a unilinear cultural evolutionary framework to a bilinear framework reflect a larger shift within archaeology, from a cultural evolutionary paradigm to a culture historical one, which took place in the 1920s (Trigger, 1996). Its influence on Peyrony and Breuil's writings is seen in their explanations of archaeological patterning as the product of different populations moving about on the landscape and influencing each other through diffusion (e.g., Peyrony, 1930:43–45).

Breuil's depiction of Paleolithic industries succeeding each other in parallel was rejected in 1950 by François Bordes in his seminal paper, "L'évolution buissonante des industries en Europe Occidentale" (Bordes, 1950). Bordes, a Darwinist, saw cultures as diversifying through time as they adapted to unique ecological conditions, rather than evolving unilinearly towards perfection (Groenen, 1994:140). Hence, he envisioned culture change as 'branching' (*buissonante*) rather than as mono- or diphyletic like many of his predecessors. Bordes' most significant contribution to the field was the development of a formal artifact typology and of a method for quantifying assemblage variation based upon relative tool-type frequencies in this typology (Bordes, 1961a). Using this method, he proposed the existence of five Mousterian facies: the Ferrassie, Quina, Typical, Denticulate, and Mousterian of Acheulean Tradition (MTA), which, he argued, represented separate, contemporaneous cultures (Bordes, 1961b; Bordes and de Sonneville-Bordes, 1970). As is well-known, this interpretation was challenged by several authors in what became known as the 'Mousterian Debate.' Sally and Lewis Binford argued that the Mousterian facies were the product not of different cultures, but of different activities (Binford and Binford, 1966; Binford, 1973). Mellars argued that a chronological order characterized these facies, and that they reflect change through time (Mellars, 1965, 1969). As archaeologists influenced by the New Archaeology began to tackle the Mousterian Debate, the field witnessed a shift away from the culture history approach that had dominated it to a focus on synchronic variability and cultural explanation (Monnier, 2006a). For instance, Dibble showed that Bordes' typology captures tools in various stages of resharpening, and concluded that facies variability therefore reflects, at least in part, differential reduction of tools (Dibble, 1987, 1988). This perspective was combined with Rolland's suggestion that Mousterian assemblage variability relates to intensity of utilization of lithic resources (Rolland, 1981), resulting in a synthesis linking facies variability to climate, intensity of occupation and utilization of resources (Rolland and Dibble, 1990; Dibble and Rolland, 1992).

1.2. Lithic technology and the chaîne opératoire approach

It eventually became evident that the Bordian methodology's focus on relative frequencies of retouched flake tools left a large portion of each assemblage (the unretouched, non-Levallois flakes) unaccounted for. It was also felt that the nature of Bordes' quantitative approach was 'dehumanizing', and that his facies did not apply to the richness of regional traditions (Depaepe and Goval, 2011). Dissatisfied by this inadequate characterization of Mousterian variability, researchers turned to new methods of analysis that focused specifically on lithic technology. The most well-known of these methodologies is the *chaîne opératoire* approach (e.g., Lemonnier, 1976), which reconstructs the sequence of technical actions involved in the manufacture of an object (see Soressi and Geneste, 2011; Tostevin, 2011 for detailed English-language summaries of the theory behind this approach). This approach was applied to lithic technology by several pioneering French Paleolithic researchers (e.g., Tixier et al., 1980; Geneste, 1985; Boëda, 1986; Boëda et al., 1990), who defined the lithic *chaîne opératoire* as consisting of all of the technological operations involved in making and using stone tools, from the selection of the raw material, to the removal of cortex and shaping of the core, to the knapping of debitage (with reshaping of the core as necessary), through to the selection, utilization, and retouching of blanks. This methodology was rapidly adopted by many other French and European Paleolithic archaeologists as a method of studying and describing lithic assemblages, and has resulted in the identification, over the past twenty years or so, of a number of technological variants, including several types of Levallois (Boëda, 1994), laminar (blade), discoidal (Boëda, 1993), Quina (Bourguignon, 1996), and biface shaping systems (Boëda, 1997; Soressi, 2002). The terminology used to describe these lithic technologies is variable, ranging from 'technological systems' and 'debitage systems' to 'production systems', 'concepts of production', and 'methods of production'. Recently, the term 'technocomplex' has emerged to signify the cognitive and technical set of behaviors inherent in a *chaîne opératoire*:

> "C'est l'ensemble des savoirs et pratiques s'appliquant aux chaînes opératoires de production lithique et partagés par un ensemble de groupes humains, qui sert à definer pour le préhistorien différents «technocomplexes»." (Delagnes et al., 2007)

This definition is key for understanding recent developments in the field, as will be discussed below, because it links the