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Using multivariate techniques to assess the effects of raw material, flaking behavior and tool manufacture on assemblage variability: An example from the late Middle Paleolithic of the European Plain

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ABSTRACT

The late Middle Paleolithic in central and eastern Europe is defined by the presence or absence of certain bifacial tools and blank production methods. Hence, the assemblages between MIS 5a and MIS 3 are classified as Mousterian, Taubachian, Micoquian, Micoquo-Prondnikien, Prądnik cycle and Keilmessergruppen, among others. We like to address here the questions of what do these assemblages look like when the type fossils ("*fossil directeur*") are set aside and what are the main drivers of variability within and between these assemblages. Therefore, we analyzed nine assemblages of four late Middle Paleolithic open-air sites of the European Plain: Pouch and Königsaue for central Germany, Wrocław-Hallera Av. for southwestern Poland and Khotylevo I-6-2 for western Russia. Our study is based on an attribute analysis of flakes, as they are the most numerous artifact type in the lithic assemblages, bearing traces of the flaking technology in their morphology. Linear and nonlinear multivariate statistical analyses of the flake attributes show similar patterns for the assemblages and show no distinctions between Mousterian and Micoquian assemblages aside from the type fossils. Additionally, assemblage variability is, except for one case, not site specific or regional. The analysis of the factors that drive within and between assemblage variability revealed that the assemblages are influenced by site preservation, raw material size and economy, as well as similar blank production and tool manufacture methods that are present in varying degrees in each assemblage. In other words, taking into account site preservation, the overall character of these late Middle Paleolithic assemblages primarily reflects the flexible application of late Neanderthal flaking and tool production methods to the local raw material constraints. Once the type fossils are removed, these assemblages represent a range of variability that cannot be grouped readily into named archaeological entities that could represent distinct human groups.

1. Introduction

The late Middle Paleolithic (LMP) in central and eastern Europe is defined, compared and interpreted predominantly by the presence or absence of certain bifacial tools and/or blank production methods (e.g. Bosinski, 1967; Jöris, 2003; Kozłowski, 2014; Kozłowski and Kozłowski, 1996; Ruebens, 2014, 2013, 2012). Following this approach, assemblages are either classified as "Micoquian", "Mousterian" or "Taubachian". The Micoquian (Bosinski, 1967; Kozłowski, 2014), Prądnik cycle (Krukowski, 1939–1948), Micoquo-Prondnikien (Chmielewski, 1969) or Keilmessergruppen (Mania, 2002; Veil et al., 1994) is defined by its type fossil ("*fossil directeur*"), the Keilmesser or bifacial backed knife - an asymmetric, bifacially shaped tool with a natural and/or retouched back opposite a bifacially retouched cutting edge (Bosinski, 1967; Koulakoskaya et al., 1993; see also Jöris, 2012, 2006). Levallois methods of blank production can be present or absent in this group, potentially related to chronologically different sub-groups (Jöris, 2003; Richter, 2002, 1997). The term Micoquian (Bosinski, 1967) refers to the French site "La Micoque" (Peyrony, 1938), layer N(6). As this layer has a problematic geological context and an underrepresentation of bifacial backed knives, Veil et al. (1994) stated that

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the assemblage cannot be regarded as typical for inventories found in central and eastern Europe. Nevertheless, we use this term here because it does not have its main emphasis on the type fossil (cf. "Keilmessergruppen"). We use it here in the sense of a "Central and Eastern European Micoquian", naming late Middle Paleolithic central and eastern European assemblages with bifacial tools. Furthermore, this term is widely accepted and commonly used in the central and eastern European literature (see e.g. Boëda, 1995; Demidenko, 2015; Demidenko and Uthmeier, 2013; Golovanova et al., 2016; Koulakoskaya et al., 1993; Stepanchuk et al., 2015; Valde-Nowak et al., 2016). Mousterian assemblages in Central Europe are characterized by frequent Levallois blank production along with various flake tools and no or a low frequency of bifacial tools (Bosinski, 1967; Kozłowski and Kozłowski, 1996). The Taubachian (Collins, 1968; Valoch, 1971) is a sub-type of the central and eastern European Mousterian with flakes, cores (Levallois technology is rare) and tools usually smaller than 3 cm (Valoch, 1988, 1984; see also Cohen and Stepanchuk, 1999; Valde-Nowak et al., 2016). Some researchers interpret these microlithic assemblages as a result of human flaking behavior (see e.g. Moncel and Neruda, 2000), or as a cultural tradition from the Lower to the Middle Paleolithic (Valoch, 1977). On the other hand, it was shown already 30 years ago (Schäfer, 1987) that the small artifact size at the eponymous site Taubach/Germany is a result of the rather small raw material dimensions (see also Weber, 2012), but that the knappers were eager to produce the largest flakes possible from that raw material (Schäfer, 1987: 264).

It is still a controversial debate whether the Mousterian and Micoquian describe distinct Neanderthal groups (Kozłowski, 2014) or if the different inventories are related to factors such as site use and occupation duration at a site or in a region, the latter leading to the term "Mousterian with Micoquian Option" (hereafter MMO, see Richter, 2016, 2002, 2001, 2000, 1997). The MMO represents four chronologically different land use cycles between 60 ka and 43 ka. In this framework, the Mousterian and the Micoquian are treated as components of the MMO. Each cycle starts with initial assemblages, representing the arrival of humans in a specific area. Initial assemblages tend to have an increased variety of raw materials with a stronger Mousterian (e.g. simple scrapers) and denticulate component, as well as bifacial tools in a less reduced state. Subsequent assemblages, like base camps or special task camps, occur when humans adapted to a region and started to exploit the local resources. Special task camps and base camps tend to have a stronger Micoquian component in terms of a higher quantity and more reduced bifacial tools. The four cycles belong to two larger technological-chronological units, MMO-A and MMO-B. MMO-A is characterized by a more Quina-type (A1) and other non-Levallois (A2) blank-production systems. In MMO-B, Levallois methods were applied exclusively, mainly centripetal-recurrent (B1) and parallel-recurrent (B2) methods. The main criticism of this concept concerns whether the MMO definition and its chronological sequence, were derived from the sequence at one site, Sesselfelsgrotte (Germany), can be applied to the whole of the central European late Middle Paleolithic (Jöris, 2003). A second criticism concerns the chronological differentiation on the basis of blank production systems, which are seen by Jöris (2003) as highly variable in the late Middle Paleolithic, whereas the production of certain tool types seems to have more chronological importance and is interpreted as independent from the blank production system.

A recent study (Shea, 2014) even suggests, to drop the "named stone tool industries" or "NASTIES" entirely. NASTIES, like Mousterian, "[…] were formulated inductively and intuitively using selectively curated collections of artifacts." (Shea, 2014: 173). Especially terms like Mousterian are not meaningful to answer questions about human behavior or human evolution. Basically, Mousterian industries occur from the late Middle Pleistocene to the late Pleistocene everywhere in Europe, North Africa and western Asia. "It tells us nothing about the paleoenvironmental context in which the assemblage was deposited. Mousterian assemblages occur in deserts, grasslands, temperate woodlands, boreal forests and alpine steppe." (Shea, 2014:174). Authors like Shea (2014) and Monnier and Missal (2014) state that technocomplexes or NASTIES are highly subjective defined entities, based on a non-empirical and unspecified mix of variables. When taken NASTIES at face value, researchers tend to overlook the variability within and between assemblages, they hamper to answer important behavioral questions, e.g. like the difference between the Levantine Mousterian made by Neanderthals and modern humans (Monnier and Missal, 2014; Shea, 2014). In other words, in the way these named entities are defined, e.g. subjective and from our modern point of view, it is potentially impossible to link these artificial entities to Paleolithic human groups. Therefore, it was suggested (Monnier and Missal, 2014; Shea, 2014) to drop comparisons between assemblage types and to use rather quantitative, attribute based methods (see e.g. Tostevin, 2012) to compare characteristics of stone artifacts across assemblages.

That the classification of assemblages after the presence or absence of certain tool types can be problematic, especially when assemblages share general similar characteristics aside from the type fossil, was demonstrated recently for the Middle Stone Age of the Maghreb, North Africa, where Aterian assemblages look identical to non-Aterian assemblages aside from tanged artifacts, the primary *fossil directeur* for the Aterian (Dibble et al., 2013). The use of type fossils to classify late Middle Paleolithic assemblages in central and eastern Europe is still current (besides above cited works see e.g. Ruebens, 2014, 2013, 2012) and has its roots in cultural evolution paradigms from the beginning of the 20th century, which were already criticized for Eurasia soon after (e.g. Tallgren, 1937). Studies on type fossils, or more specifically diagnostic bifacial tools, can answer behavioral questions about tool transport and raw material use and diversity (see e.g. Lamotte et al., 2017; Soressi and Hays, 2003; Turq et al., 2013), resharpening techniques (Iovita, 2014, 2009; Iovita and McPherron, 2011; Jöris, 2001), human migration (Lycett, 2009), as well as variability of morphological tool concepts and adaptions to different environments (see e.g. Archer, 2016; Archer et al., 2016, 2015; Veil, 1995; Veil et al., 1994). Nevertheless, classifying assemblages regarding the presence or absence of certain tool types is problematic (see e.g. a study about the Lower/Middle Paleoithic transition by Monnier, 2006). A recent large-scale study of Middle and Upper Pleistocene assemblages (Monnier and Missal, 2014) spanning from Great Britain, the Netherlands, Belgium, France, to Spain and Italy has shown that bifaces occur over the whole time span and as well in all Mousterian facies. Additionally, biface frequencies are, even in biface rich assemblages, rather low and seldom exceed 1% of the entire assemblage. Sometimes, bifaces can be entirely absent and only the shaping flakes remain in the assemblages, as it is, for example, the case in the K layers of the site Le Fieux (Quercy/France) (Faivre, 2006). Considering these findings, the main fallacy is that the absence of bifaces in an assemblage cannot serve as an evidence that humans did not make, use and transport them, especially when Micoquian and Mousterian assemblages occur in the same time frame in the same region. Therefore, we address here the question of what the late Middle Paleolithic assemblages look like when the type fossils are taken aside and the entire rest of the assemblages are analyzed. In other words, does assemblage variability also reflect the distinctions made on the basis of the presence or absence of certain tool types, and does it justify the classification of the archaeological groups that have been defined?