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Bears in the scene: Pleistocene complex interactions with implications concerning the study of Neanderthal behavior

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ABSTRACT

The evidence of modern and complex behavior is a key debate in human evolution. Neanderthals have been excluded from this debate from many years, until new insight have provided a new conception of the Neanderthal behavior. Nevertheless, although archaeological data of complex and modern behavior has been inferred, this is not a generalized scenario in Middle Paleolithic sites. In the present paper, we point taphonomical issues as the responsible for this misconservation of cognitive markers. Furthermore, we highlight the action of ursids as one of the agents that has most modified the archaeological record. Nevertheless, bears not just erase behavioral evidences, their action may also generate material realities that can be misinterpreted by archaeologist as Neanderthal behavioral markers. In the present paper we analyze issues related to organized use of space and symbolic behavior such as inhumation practices and graphical expression. We approach this issue from a multidisciplinary research based mainly in actualistic, experimental, paleontological and ethological observations.

1. Introduction

Modern and complex behavior has been discussed widely in the scientific literature. The "package" related to modernity and complexity includes evidence associated with technological, social, and cognitive innovations in relation to hunting methods and diet, hafting procedures, and heat treatment, among others (see McBrearty and Brooks, 2000; Villa and Roebroeks, 2014). All these are key cognitive markers that allow differentiation of modern humans from archaic hominins (Marean et al., 2007; Conard, 2010). Conventional explanations relate all these innovations as evidence of the modernity and complexity usually assigned to *Homo sapiens* (Li et al., 2014).

For many years, Neanderthals have been excluded from the debate related to the display of modern behavior (D'Errico, 2003). Nevertheless, recent research has provided evidence of archaeological data indicating complex Neanderthal behavior and modern cognition (summarized in Villa and Roebroeks, 2014). This evidence points towards a new conception of Neanderthal behavior, related to new insights associated with symbolic issues (e.g., Zilhão et al., 2010; Morin and Laroulandie, 2012; Roebroeks et al., 2012; Peresani et al., 2013), subsistence strategies (e.g., Scott, 1980; Blasco et al., 2014; Rufà et al., 2014; Yravedra et al., 2014; Fiorenza et al., 2015), intra-site spatial organization patterns (e.g., Chacón et al., 2012) and technological innovations (e.g., Soressi et al., 2013; Yravedra and Uzquiano, 2013; Abrams et al., 2014). Nevertheless, despite all this behavioral evidence, the debate on Neanderthal cognitive and behavioral evolution remains largely unresolved (Taborin, 1998; White, 2002; Higham et al., 2010).

Some archaeological data do support Neanderthal behavioral modernity, but the number of examples is not large, and they are considered by many as exceptions or acculturation evidence

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(Mellars, 1999, 2005). Nevertheless, we believe this is an issue related to taphonomic damage and post-depositional site preservation. Preservation has been pointed out previously as a key factor in structuring the present state of knowledge on cultural complexity and innovation (Langley et al., 2011).

Among all agents that may have changed archaeological site preservation (e.g., water, weathering, sedimentation, etc.) (e.g., Barbetti, 1986; Mallol et al., 2007), carnivores can be acknowledged as one of the most active (Binford et al., 1988; Lindly, 1988; Lyman, 1994). Their modification actions can be contextualized in the alternate use of caves by both agents (hominins and carnivores) for development of different activities (Straus, 1982; Blasco, 1997; Stiner, 2002; Enloe, 2012; Yravedra and Cobo, 2015). Modification may be related to bone damage and spatial modifications (Camarós et al., 2013a; Arilla et al., 2014) that render palimpsests difficult to study (Egeland et al., 2004;; Baena et al., 2012 vs.; Yravedra and Gómez-Castanedo, 2014). Among all carnivores that may have been responsible for such damage, ursids can be identified as animals that developed a close interaction with Neanderthals (e.g., Estévez, 2004; see; Rosell et al., 2012a).

Bears developed direct interactions with Neanderthals, as confirmed by evidence that they, together with other carnivores (Blasco et al., 2010; Pérez Ripoll et al., 2010), were hunted (Auguste, 1995; David, 1997) for meat and fur (Tillet, 2002) and for other resources (e.g., Abrams et al., 2014). Bears also presumably instigated attacks on Neanderthals, in the context of constant pressures arising from sharing the same ecosystem (Camarós et al., 2015). In this sense, the alternate occupation of the same caves is one of the most common forms of indirect interaction between Neanderthals and bears (Viranta and Grandal d'Anglade, 2012).

In the present paper, we examine different perspectives to show how bears may have served as taphonomic agents in the study of Neanderthal behavior. Specifically, we analyze issues related to the organized use of space and symbolic behaviors such as inhumation practices and graphical expression. Taphonomic experiments and archaeopaleonthological analyses related to bears are developed to provide a proof-of-concept of the degree of complexity of the interaction that occurred between hominins and carnivores during the Pleistocene and the implications it has concerning the study of Neanderthal behavior.

2. Materials and methods

A multidisciplinary approach based on hominin–carnivore interaction has been used in the present paper. In this sense, experimentation and archaeopaleontological and ethological approaches have been developed in order to provide new insight into the study of Neanderthal behavior through the relationship Neanderthals had with bears.

To do so, several experiments have been developed with extant bears (*Ursus arctos*) in the Nature Park of Cabárceno (Cantabria, Spain). This is an excellent context for developing experiments, due to the Park's policy of interfering as little as possible with animals that live in a semi-free state of liberty. In this sense, animals preserve their natural instincts in a perfect context for scientific observation. Experiments were developed following a methodology we used previously (Camarós et al., 2013b), which consisted of the performance of an experimental scenario inside the bears' enclosure. Places with no slope were preferentially selected. The spatial distribution of the bears' actions is then registered with photogrammetric techniques using targets measured with Total Station software (Leica TCRM1205) that linked them to a provisional local system. The aim of this is to control all spatial changes due to the animals' actions. One of the experiments required specific particularities, and an excavation machine was used to excavate in the soil (see Supplementary Material Fig. S1). Other methodological particulars of each experiment are described in Section 3.1.

Archaeological sites were also studied. The selected sites were those that presented traces of ursid action according to our needs (e.g., bear scratches and bear beds) and that displayed an outstanding state of preservation. We analyzed the archaeopaleontological contexts of Rouffignac (France) and La Garma (Spain). At both sites, we measured the length, breadth, and depth of the bear beds present (see Supplementary Material Fig. S2). We also analyzed other bear traces, such as scratches on the walls and soil, using scanning technology.

Our results, both experimental and paleontological, were compared with recently published research related to the study of modern and complex Neanderthal behavior. In this sense, sites such as La Chapelle-aux-Saints (France) and Gorham's Cave (Gibraltar) are cited and discussed.

3. Results

3.1. Erased behavior

The identification of structured and specialized spaces in the archaeological record reveals modern and complex behavior (Lombarde, 2012). Nevertheless, identification of original hominin spatial distributions is not always possible, due to taphonomic processes. Post-depositional processes, such as sediment movement or water action, among others (Goldberg and MacPhail, 2006), are responsible for the destruction of the original spatial connection between archaeological artifacts. Previous experiments that we developed also pointed to large carnivores as taphonomic agents capable of erasing specific spatial distributions that would reveal modern and complex behaviors to archaeologists (Camarós et al., 2013a).

An experimental series, previously developed with bears, hyenas, lions, and wolves, consisted of generation of an experimental hearth and hearth-related assemblage. Although all carnivore species interacted with the combustion structure and modified it, bears were the ones that most changed the original spatial distribution (Camarós et al., 2013a). The resulting spatial distribution revealed complete destruction of the initial experimental scenario. These results motivated the experiments presented here, with the aim of extending our knowledge of how bears have acted as taphonomic agents of spatial modification in the past.

The first experimental scenario consisted of the investigation of a spatial distribution, which revealed several aspects associated with the display of modern and complex behavior. The specialized spatial organization was composed of a unique experimental scenario, with areas linked to specific activities, such as a knapping area, a butchering area, a hearth and hearth-related assemblage zone, and a wood storage area (Figs. 1 and 2). This scenario was based on some of the best-known Neanderthal sites with a complex spatial distribution that revealed modern behavior (see Henry et al., 2004; Jaubert and Delagnes, 2007).

The results were clear and significant. Bears highly modified the experimental scenario, interacting with all areas constructed in a time lapse of four hours. During this period, a total of 10 bears modified the original structure, although the first four bears (males) were responsible for most of the spatial damage (Fig. 1). All items that composed each area were moved from their original positions, following a general radial pattern (Fig. 2).

Concerning the knapping area, the lithic “arch” disposition, composed of flint flakes and microflakes emulating the spatial result of knapping, was erased. The new spatial disposition generated a complete different shape (Fig. 2). The butchering area,

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