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Moving things: Comparing lithic and bone refits from a Middle Paleolithic site

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ABSTRACT

The refitting of both lithic and faunal remains is a basic field of research in Paleolithic archeology. In particular, the spatial dimension of lithic and faunal refitting is essential for resolving questions related to site formation processes and the organization strategies of hunter-gatherer bands. Unfortunately, although important insights can be gained by comparing the spatial patterns of faunal and lithic refits there are relatively few sites from which both types are available. Some processes causing the movement of archeological items are common to both bone and lithic remains, but others are specific to each. The similarities and differences between the lithic and faunal connections can be particularly informative when considering the type and timing of the archeological assemblage formation dynamics. This comparison may be especially useful for disentangling the roles of natural and cultural processes in these formation dynamics. To illustrate this, we will compare the refitting patterns of lithic and faunal remains in level M from Abric Romaní (Capellades, Barcelona, Spain), a Middle Paleolithic assemblage dated between 51 and 55 kyr BP. The results of such a comparison provide new insights into various formation processes, including the intrasite movement of archeological items and the relationships between activity areas.

1. Introduction

Refitting is currently a far-reaching method in the study of archeological sites. Although the first trials date back to the late nineteenth century (Spurrell, 1880), refitting began to be a common practice in the 1970s (Schurmans, 2007). The start of this new era in refitting studies was closely related to two research issues: the technological approaches to lithic assemblages, and a new interest in spatial organization patterns. Researchers soon realized that in addition to spatial and technological information, refitting provided useful data on other topics, like assemblage formation processes (Morrow, 1996; Petraglia, 1992), post-depositional dynamics (Todd and Stanford, 1992; Villa, 1982), settlement patterns (Close, 2000), and the definition and integrity of stratigraphic units (Bordes, 2000; Morin et al., 2005; Pollarolo et al., 2010). However, refitting may be hampered by the macroscopic appearance of artifacts (e.g. raw material homogeneity, patina, and thermal damage) and is particularly difficult in low-resolution palimpsests made up of a large number of depositional events, as is the case in most cave and rockshelter sites. In contrast, refitting is easier in high-resolution contexts where fewer overlapping events are represented, as is the case in many open-air sites. In addition, refitting is a time-consuming method that requires many hours to achieve results (Cooper and Qiu, 2006; Larson and Ingbar, 1992), and it is often neglected due to productivity considerations. Because of these problems, refitting is far from systematically used, despite its potential to provide information on several research issues.

In Paleolithic research, refitting was at first closely linked to the study of lithics, but the applicability of this method to faunal remains was soon realized (Hofman and Enloe, 1992). This led the way to new approaches to food sharing (Enloe and David, 1992; O'Brien, 2015; Waguespack, 2002) and carcass transport (Marean and Kim, 1998). Moreover, bone refits are ideally suited to analyzing the temporal

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relationships between activity areas, due to the restricted time span during which a bone is still useful (O'Brien, 2015; Rapson and Todd, 1992). However, there are not many sites from which both lithic and bone refits are available. In addition to the problems affecting refitting in general, this may be explained by the differential preservation of lithic and faunal remains, especially in open-air sites. Even when lithic and faunal refits are available, they are not often compared in an explicit way. In general, lithic and bone refitting are carried out by different researchers, often with distinct questions in mind. Moreover, detailed quantitative data for the different aspects of refitting, i.e., length, orientation, and the direction of connection-lines, is not commonly published, which makes inter-assemblage comparisons difficult.

Intrasite movement of both lithics and bones is one of the most significant issues that can be addressed by refitting. These movements are essential when approaching issues like spatial organization, functional and temporal relationships between activity areas, social links among household units, and post-depositional dynamics. There is a wide range of processes responsible for bone and lithic movements and these can be classified according to different criteria: time (depositional vs. post-depositional), agent (human vs. natural), and, in the case of human-induced movements, intentionality (intentional vs. unintentional). Some processes affect both bones and lithics equally. Some factors whose incidence depends on the size and/or weight of the items, like some natural post-depositional processes, tend to produce a size sorting of remains (Bertran et al., 2012; Rick, 1976; Schick, 1987), regardless of whether they are bones or lithics. Size sorting may be also the consequence of anthropogenic processes, like unintentional scuffage by foot traffic (Stevenson, 1991; Theunissen et al., 1998) and the intentional tossing of large items from activity areas (Binford, 1978; O'Connell, 1987).

In addition, social relationships between domestic units can be associated with the inter-household transport of food and artifacts, which may produce a similar refit layout for both kinds of items. If these are the only factors causing the movements, a similar refitting pattern can be expected for both bones and lithics. The bilateral and anatomical refits from the Magdalenian site of Pincevent suggested a food sharing pattern based on the movement of high-value limb bones (Enloe, 2003; Enloe and David, 1992). These data are consistent with the information provided by lithic refitting, which indicates common connections between hearth-related activity areas (Bodu et al., 1990; Leroi-Gourhan and Brézillon, 1966; Orliac et al., 2014). Most of the refits between activity areas are unidirectional, but some bidirectional movements have also been identified. The refitting patterns comprise the main argument for interpreting Pincevent as a campsite made up of contemporaneous residential units.

Other movement factors act differently on lithic and bone remains. For instance, bone remains are the most affected when carnivores scavenge assemblages previously generated by humans (Binford et al., 1988), although the movement of lithics by these agents has been also recorded (Camarós et al., 2013). Scavengers can produce a significant scattering of bone remains, leading to a displacement pattern considerably different from that seen for lithics (Bertran et al., 2015). Nevertheless, most differences in the movement of bones and lithics are related to human behavior. We can distinguish three behavioral factors that may explain these differences:

- *Spatial distribution of activities.* If all activities are carried out in the same multifunctional areas, no movements linked to this factor can be expected. In contrast, if different activities are performed in different areas, the movement of lithics and/or bones is likely. However, the directional patterns of the two elements may differ. Lithics would be transported from knapping areas to the spots where resources were being processed. The most likely transport direction of bones would be from carcass processing locations to cooking and/or consumption areas. As the spatial segregation of activities increases, different refitting patterns for lithics and bones are more likely.
- *Food sharing.* As has been reported in ethnographic studies, faunal resources are commonly shared between the social units that make up the band. Depending on the food sharing strategy, parts of the same animal are moved either from a communal processing area to the household units or from one household unit to others (Enloe, 2003, 2010; Enloe and David, 1992; O'Brien, 2015; Waguespack, 2002). Only faunal remains would be affected by this movement factor.
- *Recycling.* Items discarded during an occupation could be picked up and moved by subsequent occupants. This may be an important factor in the intrasite movement of lithics (Vaquero, 2011; Vaquero et al., 2015). Lithic and faunal remains would be affected by recycling in different ways, because they do not exhibit the same potential for reuse. Once discarded, lithics may continue to be useable for a long time, but bones lose their alimentary appeal soon after being discarded, especially when both meat and marrow have been intensively exploited. Movement of bones related to recycling for alimentary reasons is therefore unlikely. However, discarded bones can also be recycled for technical purposes (Boschian and Saccà, 2015; Rosell et al., 2015), meaning that bone movements related to this factor can not be entirely excluded.
- The action of these agents should be tested against the data from the analysis of the archeological remains. Taphonomical and zooarcheological analyses of faunal remains will indicate which anatomical parts were moved and whether carnivore marks are present; this enables us to discern which movement factor, either scavenger action or food sharing, is the most reliable. If we take into account these movement factors, five different scenarios can be envisaged, according to the degree of movement and the similarities and/or differences between the lithic and faunal refitting patterns. Each of these scenarios has distinct implications in terms of formation processes, and suggests different working hypotheses about the causes of the movements:

(a) *Similar refitting patterns for bones and lithics with no significant movement between activity areas*. This would be the characteristic pattern in contexts where movement agents have had no effect on the archeological items. This scenario would be typical of well-preserved assemblages with no functional or social relationships between activity areas. It would be also more common in assemblages formed during short time spans, in which the dynamics that appear as occupation or formation lengths increase (e.g. secondary disposal, scuffage, and recycling) are less likely.

(b) *Similar refitting patterns for bones and lithics, including significant displacements*. This would mean that both lithic and bone remains were affected by the same movement agents. Geological processes, like downslope movements, water flow, and solifluction; unintentional scuffage; or maintenance activities may be responsible for this pattern. Movements associated with post-depositional dynamics or refuse disposal would be characterized by size sorting. This scenario may also be consistent with the transport between contemporaneous domestic areas in a campsite defined by the sharing of animal and lithic resources.

(c) *Different refitting patterns for bones and lithics, with bone remains in the furthest displacements*. This would be the case when movement factors acting preferentially on bone remains are dominant. Either the activity of scavengers or food sharing may cause this pattern.

(d) *Different refitting patterns for bones and lithics, with lithic remains in the furthest displacements*. The processes acting on lithics are dominant. Recycling is the best candidate to explain this pattern, but it could be also the product of the differential distribution of activities. For instance, knapping may be spatially differentiated from the areas where lithic artifacts were used.

(e) *Both lithics and bones exhibit significant movements, but their directionality and/or orientation are different*. Two possible explanations may be envisaged. On the one hand, this pattern may be produced