
SPECIAL SECTION

When Materials Speak about Ontology: A Hunter-Gatherer Perspective

Beyond Tools and Function: The Selection of Materials and the Ontology of Hunter-Gatherers. Ethnographic Evidences and Implications for Palaeolithic Archaeology

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In this paper we discuss the universal selection of exceptional materials for tool making in prehistory. The interpretation suggested in the literature for these non-standard materials is usually limited to a general statement, considering possible aesthetic values or a general, mostly unexplained, symbolic meaning. We discuss the implications of viewing these materials as active agents and living vital beings in Palaeolithic archaeology as attested in indigenous hunter-gatherer communities all around the world. We suggest that the use of specific materials in the Palaeolithic was meaningful, and beyond its possible 'symbolic' meaning, it reflects deep familiarity and complex relations of early humans with the world surrounding them—humans and other-than-human persons (animals, plants, water and stones)—on which they were dependent. We discuss the perception of tools and the materials from which they are made as reflecting relationships, respectful behaviour and functionality from an ontological point of view. In this spirit, we suggest re-viewing materials as reflecting social, cosmological and ontological world-views of Palaeolithic humans, and looking beyond their economic, functional aspects, as did, perhaps, our ancestors themselves.

Introduction

The earliest production and use of stone tools more than three million years ago was, no doubt, a turning point in the history of humankind, considered by some scholars to be one of the defining characteristics of the genus *Homo*, setting humans apart (e.g. *Man the Toolmaker*, Oakley 1944; Holloway 1969; Premack 2010, although this approach is less acceptable nowadays). One might consider this dichotomous human–animal perspective on tools as an

anthropocentric, western and colonial one (Harris & Cipolla 2017). In contemporary indigenous societies, rather than being a dividing element between humans and other elements of the world, tools are perceived as a bridge, connecting all of them. In this light, various elements related to the making process of these tools—including the selection of materials from which they are made—reflect the relations between these elements. Can we speculate that similar perceptions were shared by humans in the distant past?

This introductory paper is part of a special section addressing the universal phenomenon of human selection of exceptional materials for tool making and its possible socio-cultural, cosmological implications. The first part of this article will briefly describe the main theme of this section and this paper, its theoretical framework and the implications for prehistoric archaeology. The second part will explore one line of thinking suggested for interpreting this phenomenon: the relational-ontology approach. Here, we will discuss the possible application of this view to Lower Palaeolithic findings, and with regard to material selection for handaxe making in particular, as a test case. Finally, we will briefly present the case studies included in this thematic section and conclude with some thoughts that could guide further attempts to enlarge our understanding of archaeological hunter-gatherer societies, including the way in which they built their cosmological world and interacted with it.

Human selection of exceptional materials: considering socio-cultural, cosmological aspects

For more than three million years, humans have been selecting, collecting and transporting various materials, mostly stones and minerals but also animal bones and shells, for the production of tools. This seemingly basic activity is far from being trivial, and it raises questions concerning the mode of adaptation, cost-benefit considerations and choices made by early humans (Beck *et al.* 2002; Brantingham 2003; Dibble 1991; Wilson 2007). Many studies emphasize techno-economic considerations, such as the quality, size, availability and abundance of knapping materials as well as location of outcrops on the displacement to foraging, as leading reasons for selection, transportation and use of knapping materials (Braun *et al.* 2009; Browne & Wilson 2011; Shick 1987; Stout *et al.* 2005). The situation is somewhat different as regards 'exceptional' materials, that is, unusual, non-standard materials identified in specific archaeological contexts, such as stones with noticeable aesthetic values, animal bones and shells, as well as materials originating from remote sources. The capacity to differentiate these from the huge amount of other materials makes them more easily identifiable in the archaeological record (even if it is possible that more common materials also have had meanings other than functional, as briefly noted in this paper). These exceptional materials, for the most part, are not overlooked, although the interpretation suggested for their presence is usually limited to a general statement, considering possible aesthetic

values or a general, mostly unexplained, symbolic meaning.

Notwithstanding any of these explanations, there might have been other factors which influenced choices of materials, and exceptional materials particularly, relating to the socio-cultural world of early humans and their ontological-cosmological worldviews. But is it possible for us to comprehend, in general, this role of 'material culture' in the socio-cultural realms and in the ontology of ancient humans? The relationship between humans and materiality has recently attracted much theoretical interest in archaeology and various other disciplines (e.g. Bell & Spikins 2018; Herva 2009; Ingold 2000; Knappett 2002), but these issues remain under-explored in prehistoric archaeology. The contributions of this section, as well as this paper, attempt to address some of these issues.

Looking at the overview of ethnographic and anthropological hunter-gatherer case studies presented, and keeping in mind the archaeological evidence suggesting that past humans most probably had social and cognitive behaviours more complex than was thought a few years ago (here we only discuss a small number of these cases, but the recent scientific Palaeolithic literature is increasingly abundant), we cannot exclude that a different perception of artefacts was most probably present in the Palaeolithic period. Possibly, material culture was produced not only for meeting functional needs, but it was a way to reflect and form relationships between a group and another group, a human and another human or other-than-human person and between a human and the landscape. How can we enlarge our understanding of prehistory through the notion that cultural material constituted a significant part of the ontology and cosmology of early human communities?

In this paper, we explore one line of thinking suggested for interpreting this phenomenon: the relational-ontology approach. We discuss the implications of viewing exceptional materials selected for tool making as active agents and living vital beings in Palaeolithic archaeology as attested in indigenous hunter-gatherer communities worldwide.

The relational-ontology view and the archaeological record

Ethnographic and archaeological literature suggests that present and past hunter-gatherers are constantly engaged in establishing and maintaining social relations between human group members and other-than-human persons (Betts *et al.* 2015; Bird-David

1999; Hill 2011; Naveh & Bird-David 2014; Viveiros de Castro 1998), designated to ensure that current ways of life will be sustained (Barkai 2019; Tanner 1979). Beyond the functional aspect, producing and using tools is one way to maintain relations between the different elements of the world, as they reflect perceptions transmitted over generations regarding the relations of humans with other-than-human persons. Tools are also active agents, means of interaction with various elements in the world and a way to form and keep relationships with them (Hill 2011; 2018; McNiven 2018). Following this approach, it is probable that the process of making a tool, i.e. selecting the material which the tool will be made of and forming its shape, is of great importance to indigenous societies and their relationships with the world.

A world of relations

The perception of tools and the materials from which they are made as mediators, reflecting relationships and as means of interactions, is part of a much wider world-view of contemporary indigenous groups, including hunter-gatherer societies (such as the Indian Nayaka, the Canadian Ojibwa, the Inuit and various societies of the Arctic, Subarctic and Amazonia). In these societies, the world is perceived as composed of living human and other-than-human persons or agents (e.g. Betts *et al.* 2015; Bird-David 1999; Harrison-Buck & Hendon 2018; Hill 2011; Nadasdy 2007; Viveiros de Castro 1998) for whom life is an ‘ongoing creation’ (Ingold 2000; 2006). They are capable of thinking, feeling and behaving in ways that resemble or mirror human thought and behaviour and have the capacity to affect human health and well-being (Hill 2011).

The Nayaka and the Ojibwa, for example, communicate with and approach forest trees, hills, stones and animals as persons. These are treated as social partners or spiritual guides under certain circumstances (Bower 1999; Naveh & Bird-David 2014). Tanner (1979, 202) indicates that for the subarctic Mistissini Inuu ‘A central attribute in the conduct of hunting is that game animals are persons and that they must be respected’. These ontologies differ in many ways from the Western belief system, which often conceptualizes animals, plants and stones as resources to manipulate, use and consume (Hill 2011), and mainly as ‘others’—a distinction claimed not to have been made by present and past hunter-gatherers.

Therefore, at the heart of this ‘archaeology of ontology’ approach (Alberti 2016) lies the perception of relation-based interactions between humans and

other-than-human persons. Engaging and forming reciprocal relations such as these is considered to be vital, and it is practised in everyday life by all persons of the group (Harrison-Buck & Hendon 2018). Hill (2011) suggests that prehistoric hunters in the Arctic treated animals as agential persons, involved in social practices intended to facilitate hunting success and avoid offending prey. Their thoughts and actions established and maintained relationships with prey animals as a dynamic social behaviour embedded within the context of daily life. The Nayaka form their own personhood by maintaining sharing relationships with surrounding beings, humans and others. They do not dichotomize other beings to themselves (see Bird-David 1999) but regard them, while differentiated, as intertwined. This pattern of relationship is vital to the Nayaka collective identity as well as to what may be explained as personhood (Bird-David 1999). Relational personhood can be described as ‘a community of people only some of whom are human’ (Harvey 2006, 82; see also Bird-David 1999; Ingold 2000; 2006). Indeed, not all other-than-human elements are ‘persons’; they must display, like humans, the capacity to ‘be with others, share a place with them, and responsibly engage with them’ (Bird-David 2006, 43). This idea is embodied in the very concept of a ‘person’ as a component of a relation-system (Bird-David 1999). Relational ontology, then, blurs the boundary between organism and its environment and rejects the subject–object dualism (Herva 2009; Ingold 2006; Järvillehto 1998).

Objects as living vital beings

The notion of objects as agents has become an important theoretical component in anthropology (Hendon 2017), perhaps since these elements have an emotional effect on people, providing a sense of comfort and security (Bell & Spikins 2018). When we engage with material things, those things become part of our perceptual–behavioural–cognitive capacities (Bell & Spikins 2018; Herva 2009), and presumably, were so in the past. Looking at objects as ‘object-persons’ (Alberti & Bray 2009; Zedeño 2008; 2014), having the ‘power to shape human behaviour and influence change’ (Zedeño 2014, 121; see also Brown & Walker 2008) and by way of a relational thinking enables us to focus on overlooked aspects of material culture and reassess the significance of both everyday and special features of archaeological material (Herva 2009).

Similarly to animals, materials used in everyday life, such as stones, are not perceived by recent

indigenous societies (including hunter-gatherer groups) as passive objects destined to be exploited for economic benefit (Conneller 2012). Rather, they are considered as part of the cosmos, playing an active role in the social, cosmological and epistemological realms of life. In the circumpolar north, personhood was not limited to humans and animals, but also applied to certain objects: the term 'awareness' (Central Yup'ik *ella*) is used to describe the Yup'ik conception that objects are sensible and agential (Hill 2011). Among the Nayaka, 'Rocks and stones were and sometimes still are personified as and when engaging with them' (Naveh & Bird-David 2014, 84). In certain Native American contexts, stones can converse with humans (Harris & Cipolla 2017). It seems that in many of these societies, the role of each thing in the social network is more significant than the thing itself, on its own. Of course, 'objects' is a general term, while each object, material and tool may have its own specific relationship and role in the ontology of each human group.

The role of tools as agents/living beings

Recent studies reconsider technology as a two-way process effecting, in a similar way, both people and what are considered as materials, reflecting the embodiment of values and beliefs transmitted over generations (Arthur 2018; Hendon 2017; Hollenback & Schiffer 2010; Ingold 2000). Technology is reframed as 'a set of relationships between people and between people and the materials with which they work' (Hendon 2017, 155). Therefore, despite the greater focus on human–animal relations in the ethnographic and archaeological literature, the personhood and relations embodied in tools is gaining increased interest. Tools are made and used by humans for procuring, processing and consuming other-than-human persons (animals, stones, plants and so on). Therefore, by virtue of the persistent use of these tools, traditions embodying the relations with these elements are being created and preserved, as the present is maintained, and the future is being secured. Tools may thus reflect a dialogue between human or other-than-human person, but also as capable living beings. Among the Arctic Inuit groups, every element of the natural world has an *Inua*—an essence or a spirit—including objects and tools (Fitzhugh & Kaplan 1982). The concept of *Inua* in daily life was used in hunting through hunting tools, as a way of communicating with the prey and with the aim of pleasing the animals and demonstrating respectful behaviour, in order to guarantee success. The functionality of hunting tools was

dependent on the material and design, among other things. McNiven (2018) also describes Melanesian Torres Strait canoes (AD 1400–1850) as 'object-beings' designated to facilitate socially and culturally desirable engagements with the marine realm. Among the Gamo of Ethiopia, stones and stone tools are perceived as living beings that have life-cycles from birth to death, similar to humans (Arthur 2018).

What about the materials from which tools were made, as reflecting relationships, respectful behaviour and functionality from an ontological point of view? Previous studies suggested that tools could attest, besides their functionality, to the aesthetic and symbolic conventions of past human societies, reflected, *inter alia*, in the choice of materials from which they were made (Boivin *et al.* 2007; Brumm 2010; Duff *et al.* 1992; Graves-Brown 1995). Features such as texture, shimmer, colour and susceptibility to polish are inseparable characteristics of materials, which cannot be ignored. The remoteness of time tends to preclude non-technological considerations; therefore, lithic studies are mostly conceived in techno-typological and economic terms, creating a most probably false distinction between objects and their meanings (Graves-Brown 1995; Taçon 1991). Ethnographic and ethno-historic studies describe how aesthetic, cultural and ontological aspects are embodied in the production process and use of various artefacts (Duff *et al.* 1992; González-Ruibal *et al.* 2011; Jones & Bradley in Gage 1999). Few studies, though, discuss their possible role in the ontology as reflecting relations (see Arthur 2018; Hill 2011).

Hill (2019) discusses watercraft of the western Arctic coast as 'hybrid assemblages of materials that were themselves implicated in relational networks'. The construction and maintenance of watercraft, from this perspective, was a complex social process connecting humans, animals and materials such as driftwood and sealskins with their own agential properties. Many forms of stone tool produced over the past 6000 years in Australia, for example, are said to reflect ontological aspects. The Aborigines of the Western Desert have a special category for stones with distinctive colour, shape or texture, such as quartz crystals, mica and oddly shaped bits of agate. Several quartzite shelter sites were used as quarries; the material was believed to be the petrified remains of the bones of certain ancestral beings (Taçon 1991). Certain types of colourful stones were chosen to make the most significant stone tools, such as quartzite blades and axe heads or other tools made from banded colourful chert, which was considered to be the most powerful. Rainbow motifs

form a significant part of the ontology of these groups and accordingly chert with rainbow patterns was chosen specifically for tool making (Taçon 2008). However, beyond the aesthetic properties of specific materials, the location or the source from which the material is brought is often of great ontological importance on its own. Studies show that particular quarried stone outcrops were preferred over those of identical or equivalent quality as the focus for intensive axe production and long-distance exchange—the Mt William greenstone axe quarry in Australia, for example (Brumm 2010). According to the ontology of the indigenous peoples of the Pacific Northwest, large volcanic peaks are the home of powerful beings and unique materials such as obsidian, selected specifically for the production of artefacts. These artefacts, then, embody the ontology of the landscape from which they were procured (Reimer 2018).

What can we say, in light of these examples, about the likelihood of the universal phenomenon of selecting exceptional materials in the Palaeolithic? Can we apply the relational view to Palaeolithic objects, and thereby deepen our understanding of the inter-reliance of early humans, tools, minerals, plants and animals?

The selection of exceptional materials during the Palaeolithic: the handaxe as a test case

The presence of various Palaeolithic artefacts made of particular, sometimes exceptional materials might demonstrate the relational-ontological perception as means of interaction with different elements of the world. Archaeological evidence shows that, as early as the Lower and Middle Palaeolithic, humans had specifically selected certain exceptional materials and brought them to the habitation site for non-economic reasons. Fossils, quartz crystals, ochre, colorful stones and other minerals were discovered as single finds in occupation levels of various sites in Eurasia and Africa and could be included in this evidence (Assaf 2018; Beaumont & Vogel 2006; Edwards 1978; Goren-Inbar *et al.* 1991; Moncel 2012). Moreover, there is indication of the selection of exceptional materials from a range of suitable sources in order to produce tools, reflecting profound knowledge and great effort invested in acquiring these materials as early as the Lower Palaeolithic period (e.g. Agam & Zupancich 2020; Bar-Yosef & Goren-Inbar 1993; Belfer-Cohen & Goren-Inbar 1994; Ekshtain *et al.* 2014; Stout *et al.* 2005). At the site of Ubeidiya, Israel, dated to *c.* 1.4 million years ago, core-choppers tend to be made

of flint, sub-spheroids of limestone and bifacial tools of basalt (Bar-Yosef & Goren-Inbar 1993, 111; Belfer-Cohen & Goren-Inbar 1994). A correlation was also detected at Gesher Benot Ya'aqov (Saragusti & Goren-Inbar 2001), where basalt was clearly preferred for the production of bifacial tools, flint for the manufacture of flakes and flake tools, and limestone for the production of chopping tools. This selectivity in the Acheulian does not seem to be related to the availability of these materials in the surroundings of the sites (Belfer-Cohen & Goren-Inbar 1994). In the absence of systematic use-wear analysis, we cannot exclude that this diversification of raw material was partially due to functional aspects and to the response and constraints of each resource during specific tasks. At the same time, however, we cannot exclude the existence of complex relationships between raw material, landscape, use and meanings. Selectivity in material selection was also observed in Mousterian sites (Delage 1997; Weinstein-Evron *et al.* 2003), and it was suggested that complex social and cultural considerations affected this behaviour (Ekshtain *et al.* 2017).

What about 'exceptional' materials? Colourful, bright stones with noticeable aesthetic values (such as obsidian and colourful chert, quartzite and lava) were selected and used for the making of scrapers (e.g. patinated colourful flint: see Efrati, this volume) and points (e.g. colourful burned stones: see Coulson *et al.* 2011). Specific animal bones were also preferred for the making of specific tools (e.g. bone points from Fa-Hien Lena Cave in Sri Lanka: see Wedage *et al.* 2019). This phenomenon is especially intriguing when it comes to handaxes, the '*fossil directeur*' of the Lower Palaeolithic period.

While there are some general common features to all handaxes, at least to some extent, these artefacts vary widely in terms of size, shape, applied technology, the type of the selected blank, material type and degree of regularity (Wynn & Gowlett 2018). This variability was attributed to various factors, including raw material availability (see Sharon 2008 with bibliography). It seems, though, that the form of the handaxes was 'over-determined', as described by Wynn and Gowlett (2018)—that is, Acheulian knappers invested more effort in the shaping of the handaxes than was necessary for their functionality—and that additional considerations played a role in their manufacture, including cultural traditions (Wynn & Tierson 1990).

A number of studies have demonstrated the selection of specific materials for the making of bifaces (in addition to those mentioned above); the selection of 'exceptional' materials is also of note:



Figure 1. Unifacially knapped handaxe from Revadim, preserving the circular pattern in the centre of the item.

elephant bones were repeatedly selected for the making of handaxes, as discussed by Barkai in this volume (see also Zutovski & Barkai 2016); obsidian handaxes were found at the Acheulian site of Kariandusi, Kenya (Bourlière & Howell 1963, 622) and at Gadeb and Melka-Kunture in Ethiopia (Piperno *et al.* 2009). At Middle Pleistocene Sima de los Huesos (Spain), human remains were found alongside a single handaxe, made from a reddish-light brown quartzite—a rock type rarely selected for use at nearby sites. The unique colour of the stone may have been a key reason it was chosen to be deposited with the skeletons (Carbonell & Mosquera 2006). A handaxe from West Tofts, Norfolk, bears a fossil of a bivalve mollusc shell embedded in the flint. It appears that the fossil played a role in the selection of this particular piece of stone, and the knapper avoided flaking the area that bore the fossil. Similarly, a handaxe was found at Middle Gravels at Swanscombe bearing a ‘shepherd’s crown’—a symmetrical fossil embedded in the flint—suggesting it was intended to be the central feature of the tool (Oakley 1981). At the late Acheulian site of Revadim (Israel), a unifacial flint handaxe showing a concentric pattern in its centre was found. We suggest that this pattern was most probably intended to be the central feature of the tool; therefore the item was unifacially rather than bifacially knapped in this case (Fig. 1).

Indeed, these are extraordinary Lower Palaeolithic examples—both in context and material. How can we tell, in light of this, if they reflect a deliberate, meaningful choice? Moreover, how can we understand whether these choices reflect social perceptions rather than individuals’ preferences? First, we argue that the presence of single finds does not exclude a wider social meaning. We consider any human (*sapiens* as well as pre-*sapiens*) selection as motivated by a world-view, which is never

disconnected from a broader, social context or ontology. The biface is one of the most prominent markers of the Lower Palaeolithic period, which was suggested to reflect both functional and cultural preferences (e.g. Claud 2012; Kohn & Mithen 1999; Shipton 2013). The significant role of this tool in butchering large animals embodied dietary as well as social significance; its creation became a social norm, a tradition passed down through generations serving as an anchor that enabled the development of innovations in other fields (Finkel & Barkai 2018). Although it is argued that the consistent morphology of Acheulian handaxes (not altered by environmental changes) has been genetically transmitted (Corbey *et al.* 2016), other authors claim that their repeated appearance in archaeological sites worldwide for more than 1.5 million years reflects conformity and high-fidelity cultural transmission processes practised at this early stage of human history (Lycett & Gowlett 2008; Shipton 2010; Tehrani & Riede 2008). The question is—can we consider ontological aspects with regard to early Palaeolithic items, and examine them with a relational-ontology view? This certainly raises a number of significant theoretical and methodological challenges and questions currently debated in the archeological and anthropological disciplines.

Socio-cultural aspects related to material selection in the Palaeolithic are usually discussed in a very general way (e.g. ‘the human factors’: see Wilson 2007). Style, for example, has been suggested as a possible explanation for inter- and intra-lithic assemblage variability in prehistory (Mackay 2011), and tools made of ‘exceptional’ materials are usually attributed to some kind of symbolic activity. Ontological-cosmological aspects, however, are rarely included under the ‘socio-cultural umbrella’. One of the greatest obstacles, in terms of research, is the attempt to isolate these considerations from

economic ones in order to strengthen the argument of their past existence. Indeed, the quality of the materials and functional reasons cannot always be excluded, not even in the case of 'exceptional' materials. It is also probable that these 'economic' traits might have been part of the considerations behind their selection, but these do not rule out ontological aspects. In fact, it is possible that they might have set the ground for ontological traditions to be formed and established, since anchoring ontologies in the group's narrative is an effective way to transmit valuable knowledge related to the desired, suitable knapping materials for the next generation (see Arthur 2018; Blurton-Jones & Konner 1998).

In light of these arguments, we suggest that the selection of specific materials for handaxe production might attest to its important role in the ontology as reflecting the relationships of Lower Palaeolithic humans with various elements of the world (such as large game animals, minerals and landscapes). Taking a wider perspective, archaeological and anthropological evidence (as presented in this paper as well as other contributions in this section) implies that the selection of materials for tool making in prehistory might have been a complex process, involving social, economic, functional and cosmological considerations. As early as the Lower and Middle Palaeolithic, the selection of particular (sometimes exceptional) materials for the making of specific tool categories—such as scrapers, points and handaxes—is of note. These tools were well embodied in the cultural traditions of ancient humans; therefore, this selection of specific materials for their production may reflect ontological world-views of those who produced and used them and their social group. We thus argue that ontological-cosmological considerations should be included when discussing lithic-related behaviours practised by ancient humans.

The thematic section: 'When materials speak about ontology: a hunter-gatherer perspective'

In this section, born of a meeting and stimulating collective discussions, we address some of the issues discussed above while focusing on human selection, collection and use of exceptional materials for tool making while combining a critical use of archaeological and anthropological viewpoints. The papers address the modalities of human selection and modification of these materials and their possible role in the culture and ontology of early humans.

The broad relevance of the questions addressed to archaeology of hunter-gatherers is indicated by the

geographic and temporal reach of the case studies presented. These range from the Lower Palaeolithic in the Old World through the Australian Pleistocene and Holocene to historic, Ethiopian societies. The diverse set of case studies will be discussed by contributors coming from different backgrounds and approaches, attempting to deal with the universal phenomenon of selecting and modifying exceptional materials. Some contributors agree that this phenomenon might reflect shared perspectives of early humans towards the different elements of the world they lived in—humans (Efrati, this volume) and other-than-human persons: animals (Barkai, Romagnoli, Freeman *et al.*, this volume); plants and stones (Arthur, Romagnoli, this volume)—on which humans were dependent and interacted. Others question whether we can overcome the problem of geographic and temporal gaps and successfully interpret it (Hiscock, this volume).

The papers look at the materials of which objects were made as a significant part of the perceptual world of early humans that could have had a specific meaning, beyond the functional and economic advantages. Since ancient prehistory, selected materials could reflect a rich variety of complex relationships of human beings with the world surrounding them and on which they were dependent (Barkai, this volume). The tools made of these materials reflect a social discourse between the sender and the receiver (Hiscock, this volume), signalling towards different elements of the natural world, human and other-than-human alike. The selection of specific bones/minerals could be a way to communicate ideas; part of the process of becoming familiar with a landscape and interacting with it (Efrati, Freeman, Romagnoli, this volume), a way of guaranteeing that any procurement strategy will be successful, and also a way to preserve concepts, including useful information and knowledge passed down throughout the generations (e.g. relating to the qualities of a specific material, for example: see Arthur, this volume).

Exceptional materials as reflecting relations: some theoretical and methodological concluding thoughts

The universal phenomenon of human selection of exceptional materials for toolmaking, discussed in this and the following contributions, raises a number of significant theoretical and methodological questions.

The main obstacle in dealing with this issue stems from the fact that most Western scholars assume that early humans—especially pre-*sapiens*—

were motivated primarily (as a default) by economic, cost-benefit considerations rather than ontological-cosmological ones. Furthermore, all concerns about ontological-cosmological meanings in past communities stay in the sphere of assumptions and ideas. They can be supported by philosophical, ethnographic and anthropological arguments, but their scientific demonstration is challenging; some authors are reluctant with this limitation. These aspects, however, have shown to be inseparable, even today; the distinction between technology, economy and other aspects of society is artificial and does not allow us to appreciate fully the perspectives of the people we are studying (Hendon 2017), and deeply explore their perceptions and relations towards different elements of the world surrounding them. The aim of the archaeological discipline is to study past humans and their lifestyles. The functional-economic and the ontological-cosmological meanings and needs are both part of human life.

Clearly, the direct and immediate application of ethnographic analogy to make inferences about early humans should be made cautiously. However, the fact that indigenous societies around the globe share similar relational-based ontologies (while their essence can be culturally and socio-economically dependent and varied) should be considered. The theoretical background and archaeological-anthropological evidence presented in this paper (and in this section in general) lays the ground for examining prehistoric lithic items in this perspective.

We suggest that the use of specific materials in the Palaeolithic was meaningful, and beyond its possible 'symbolic' meaning; it reflects deep familiarity and complex relations of early humans with the world surrounding them—hills, animals, plants, stones, water—on which they were dependent, as well as other humans. Materials and objects might have been perceived as active agents, living vital beings, charged with social and emotional meanings. Both objects and their meanings were sometimes passed down over many generations. The continuous production of tools with specific and/or exceptional materials, sometimes for hundreds of thousands of years, as evidenced in the Palaeolithic record, might reflect such an idea.

Being an inseparable part of the landscape and of sharing daily life, stones, animals and plants must have had a special significance in the world of prehistoric humans, possibly acting in the cosmological realm (e.g. Conneller 2012, 76–102)—by which we refer not only to exceptional materials (which are the main focus here, since they are easier to engage in the framework of this theoretical interpretation), but to all materials. Relations with the

world are expressed in every aspect of life and material culture, in past and present human groups. Tools made of these materials were also used for processing some of them, thereby creating a circle, or a meshwork of relations between humans and these elements. Each of these artefacts found in an archaeological site is thus far from being an 'inanimate', lifeless object. Rather, it embodies the cultural conventions and ontology of the person who selected the material from the landscape, collected it and finally formed its shape. Indeed, the identification of these holistic cosmological aspects in past material culture studies is challenging. However, we believe that a better knowledge of indigenous hunter-gatherer cosmology and ontology may improve the archaeological interpretation of Palaeolithic communities and of past cultural material. After all, as archaeologists interested in understanding past human behaviours, we cannot exclude that the tendency to look beyond the function of a tool is a universal human trait. As scientists, we must make the effort to look beyond the function of tools—as did, perhaps, our ancestors.

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