J Archaeol Method Theory (2016) 23:1307–1332
DOI 10.1007/s10816-015-9265-8

Reflections on the Identities and Roles of the Artists in European Paleolithic Societies

Carole Fritz[1] · **Gilles Tosello**[2] · **Margaret W. Conkey**[3]

Published online: 29 October 2015

Abstract In an attempt to introduce concerns with social identities into the discussion and understanding of the making of what we call Paleolithic art, this article considers issues of gender, skill, apprenticeship, and tradition. We note that, as in every period of history, Paleolithic art can be seen as embedded in the society that studies it. Over the last 20 years, the research attention given to women in Paleolithic societies has grown considerably, leading us to ask what could have been the roles of women in Paleolithic art. On what criteria could we base a determination of those roles or of other social identities that were likely part of the making and viewing of Paleolithic art?

Thanks to our microscopic analysis of engravings, it is possible to identify the skill level and expertise of the artists and thus to address the question of apprenticeship and how these techniques were transmitted. We observe many similarities that allow us to group together various works of art, sometimes from very distant sites, which indicate a movement of ideas, objects, and people. Are we talking about "imitation"? How can we define an "invention" within a social context strongly bound by traditions?

Keywords Paleolithic art · Gender · Apprenticeship · Imitation · Invention · Cultural group

✉ Gilles Tosello
gilles.tosello@wanadoo.fr

Carole Fritz
carole.fritz@me.com

Margaret W. Conkey
meg@berkeley.edu

[1] CNRS, UMR 5608 TRACES, CREAP Cartailhac, Maison de la Recherche, 5 allées Antonio Machado, 31058 Toulouse, France

[2] UMR 5608 TRACES, CREAP Cartailhac, Maison de la Recherche, 5 allées Antonio Machado, 31058 Toulouse, France

[3] Department of Anthropology, University of California, Berkeley, Berkeley, CA 94720-3710, USA

Introduction

What we have called art in the Upper Paleolithic in Europe covers a period of over 30 millennia. We know and have inventoried many images, preserved on cave walls, blocks of stones or bone fragments and objects. With more than 100 years of research, stylistic and technical analyses as well as modern dating techniques have enabled us to generate a chronological time frame, to infer changes in thematic representations or technical know-how, whatever the objects, sites, or periods in question, and hence to elaborate new hypotheses concerning various practices, choices, and perhaps meanings. Most of the time, research is conducted at a general level, that of a presumed cultural group such as one of the techno-chronological "cultures" (e.g., Lower Magdalenian). It is more difficult to consider Paleolithic art on a more individual level, that is, on the level of the "artist(s)" or the maker(s), as the social contexts, the rules, and the habits that define the place and status of individual makers are not directly accessible to us. This leaves us primarily with the actual works themselves. However, in combination with available contextual information, the in-depth and more forensic study of these materials, forms, and images offers a vast field of possible research.

As for every period in history, the Paleolithic arts can be taken as material manifestations produced by social and cultural motivations and practices. We are interested here in trying to trace three inter-related dimensions of the cultural production of the corpus of "Paleolithic art": (1) Can we approach the role of gender or at least of the variety of potential artists; (2) is there evidence for apprenticeship in the actual learning, making, and transmission of identifiable practices, and thus (3) can we make inferences about such key phenomena as tradition, invention, and imitation? In the macroscale interpretations (such as the art having functioned as hunting magic) that have dominated the study and interpretation of Paleolithic art, these potential more microscale dimensions of practice—and subsequent insights into how we might better come to understand this ever-enchanting (after Gell 1998) phenomenon—may well provide a more nuanced, rather than monolithic framework for further interpretations.

For example, over the last 20 years, there has been original attention given to the roles and activities of women in Paleolithic societies (e.g., Conkey 1991, 1997; Soffer *et al.* 2000; Cohen 2003, 2005; Owen 2005; Adovasio *et al.* 2007) What was or could have been the role of women in Paleolithic art? What criteria would we use to infer such roles? In relation to our second dimension of inquiry, it is thanks to the microscopic analysis of engravings that we can identify the skill level and expertise of some artists, to address the question of apprenticeship and how these techniques were transmitted. What with the widespread geographic distribution over many millennia where this art developed, we can today observe many similarities that enable us to connect various works, some of which are found in sites quite distant from each other, indicating that there must have been a movement of ideas, objects, and/or people. Are we talking about imitation or a common source of inspiration? How can we identify and define an "invention" or even innovation, especially in terms of "form," within a social context that appears to be strongly bound by traditions?

These are some of the questions and issues that we will address. Our goal is to bring together empirical research and theoretically informed working assumptions in order to try to humanize or "people" our accounts of a distant past. This distant Paleolithic past has loomed large in our contemporary modern narratives of human antiquity, of

progress, and of materiality. As far as Paleolithic art has been concerned, this has primarily been a world of anonymous—but presumedly male (e.g., Russell 1991; Conkey 1997; Van Gelder and Sharpe 2009)—artists. We suggest that our work here is an attempt to look for a kind of intersection of social roles in the sense that such aspects as the social personae and social identities of the image-makers may well have been created and sustained by relative skill or talent (in the eyes of Paleolithic peoples) that, in turn, may have together influenced the larger processes of invention, imitation, and tradition. Although we are not yet able to make precise the interconnections of these different dimensions of social identity, we nonetheless explore here how such dimensions might have existed and contribute to a new way of thinking about the art, one that is more rooted in social practices than in the grand schemes of art as hunting magic, as a structuralist grammar, as part of shamanic society or as an aesthetic sensibility. These latter formulations have been the primary guiding interpretations for well over a century of research in Paleolithic art (see e.g., Conkey 1987; White 2003; Moro Abadía and González-Morales 2008).

While we have rather boldly suggested that we are pursuing insights into the identities of those who engaged in the production of what we call "Paleolithic art," we will clarify what we mean here by "identity." This is a longstanding and ever evolving dimension of research in archaeology (e.g., Shennan 1989 and see Dîaz-Andreu and Lucy 2005 for one historical overview). Much ink has been—and continues to be—spilled over what is meant by identity, how identities are crafted, embodied, and entered into social life, as well as if archaeologists are able—and if so, how—to infer identity, "identity formation," or how the processes related to the playing out of identities are to be part of archaeological interpretations. Does the search for identity also mean that we are able—or can expect to—identify individuals or even "analytical individuals" (Redman 1977; Foulds 2010)? With the "making" of objects or even of Paleolithic images, it may be possible in some instances to identify an "individual hand" (e.g., Appelaniz 1984). While this is not our attempt, we do suggest in our discussion of different skill levels that the forensic readings of engraving (in our case) can differentiate among likely artists or makers: those who had experience and had learned how to accomplish certain results and those who were still learning, experimenting, and/or not very skillful. As we hope to show, we can move toward identifying the makers of some Paleolithic images/objects by identifying and delineating patterns that likely were produced at the level of the individual—an engraver's hand, a child's footprint. But given the many millennia over which these images and objects of Paleolithic art were produced and the large sample size, this paper is not aimed toward the systematic identification of specific individuals. Rather, we address some of the dimensions of those social actors who were involved in the production of these Paleolithic arts—aspects that archaeologists consider in their research into past identities, such as age or sex or even a kind of social group (e.g., experts, learners, others). Despite the caution that is often leveled at those of us working in deep time about such "elusive" features as identity, provocative attempts at probing how identity was constituted and expressed have provided insightful analyses in longer treatises than we aim for here (e.g., Gamble 2007).

In fact, we are less ambitious in that our interest is really more along the lines of "zooming in" on the production, the making, of the Paleolithic arts than on considering how such making was part of identity—formation in Paleolithic societies. Our aim is—

to paraphrase Gamble (1999:1–31: see also Gamble and Gittens 2004), who earlier suggested that we "pull aside the Paleolithic curtain" to let in the social dimension—to pull aside the interpretive curtain of Paleolithic art, so-to-speak, as most Paleolithic art has been interpreted at a grand, inclusive (perhaps smothering?) scale. To pull it aside would be to zoom in, to explore who might have been those making and producing it and what are the implications for understanding it as a process, as a material production by varying individuals and perhaps social groups. That is, for us, identity here is taken as a way to inquire at a more microscale and as a way to insert possibilities about social personae and social actors into what have primarily been rather "grand narratives" of interpretation, such as hunting magic or shamanism.

And What if the Artist Were a Woman? The Challenges of Engendering

This is perhaps the most difficult of our three dimensions of social identity that we wish to pursue. As in other areas of knowledge, reflections on art in prehistoric Europe have been put forth in the context of the current themes and subjects within the society in which researchers live (Moro Abadía and González-Morales 2008). To inquire into possible genders of the Paleolithic artists is a topic that has recently become of interest. On one hand, the roles of women and of gendered lives in the twentieth and now the twenty-first century society have been undeniably of considerable discussion in contemporary societies. On the other hand, even archaeologists have been engaged with issues about "engendering" the human past (e.g., Bolger 2013, among many). From the start, we readily admit that the very concept of "gender" has been in considerable transition and is a much more complex phenomenon than merely identifying if a past social actor were a male, a female, and/or "third" (or more) gender(s).

But, such recognition that there were even women/females as social actors in the past has not always been the case. In fact, the presentation of European prehistory (and even worldwide prehistory) has primarily been one essentially peopled by men who accomplished all the "nobler" duties of life: knapping flint, making weapons, hunting, and art. By implication, the role of women was apparently restricted to procreation, raising children, and the less prestigious subsistence activity of gathering. This is a view about prehistoric social life that is still prevalent and propagated (e.g., Delluc 2012:22). A specific and gendered division of labor according to sex is a transposition of a bipolar organization of nineteenth and twentieth century society in the West (and see discussion of Kuhn and Stiner 2006). It is also often based on an uncritical understanding of the ethnographic reports that were all so often framed through these same dichotomous assumptions. Cohen (2005:1) sums up how since "the remains collected by prehistorians do not allow us to assign with certainty, a given activity to a particular gender … women were considered for a long time [to be] 'archeologically invisible'." Men have therefore been the dominant actors in prehistory, since there is no formal proof for women as active agents (even if formal proof for men as "the" actors cannot be marshaled either). Other arguments against the contributions of women are of a purported practical nature: Certain activities such as flint knapping or spear throwing require a physical strength beyond that of which women are presumed capable (but see Gero 1991; Weedman 2002; Weedman Arthur 2010). Similarly, hunting for large game is dangerous and unsuitable for pregnant women or women accompanied by very young children. This kind of argument, as has been much discussed over the past

decades (e.g., Slocum 1975), derives from some problematic universal assumptions about biologically based notions as well as on the assumption that big-game hunting is the primary marker of life in prehistory (but see Owen 2005) or in arctic hunting economies (but see Brumbach and Jarvenpa 1997; Jarvenpa and Brumbach 2006, 2009).

By invoking ethnological comparisons, other supposed justifications for an androcentric account of prehistory have been advocated. For example, there has been the argument that, in most known twentieth century hunting societies, women may not partake in blood-provoking activities (such as hunting) because of the taboo regarding menstrual blood (Testart 1986). We could continue the list of such arguments based on comparisons with current or recent societies that all tend to remove women of the Upper Paleolithic from any major role in economic—and by extension—symbolic and prestigious (to us today) activities. It was not until the 1980s—especially in the study of the European Paleolithic—that "the invisible half of prehistoric humanity" (to use Cohen's expression) gains a certain presence or at least that this "invisibility" is recognized for what it usually is, namely "the result of a false notion of objectivity and of the gender paradigms that archaeologists employ" (Conkey and Spector 1984:6). Most recently, Dyble *et al.* (2015)) have presented ethnographic data and agent-based modeling to support the idea that, in fact, "sex equality" in residence choice among hunter-gatherer societies was a crucial feature of human social organization.

In practice, what can be stated about the gendered dimensions of symbolic expressions, of what is commonly called "art"? Or at least, what can be said about who the image-makers might have been? Most of the objections raised above in relation to the presumedly male prestigious hunting (physical strength, danger, child protection) are not applicable here, and yet, the Paleolithic artist is still perceived as primarily male. For example, one suggestion is that certain anatomical or ethological details of the animals that predominate in European Paleolithic art could only have been noticed and understood well enough (and hence drawn on the cave walls or objects) by hunters and hence by men (Fig. 1). Yet, hunting is much more than the fatal thrust of a spear: It involves observation and understanding of ethological habits and the location of suitable game (often a contribution from those who are out on the landscape gathering the basic resources, cf. Heinz 1978 and discussion in Conkey *et al.* 1984:13), as well as the butchering and further processing of game, once taken. Indeed, the role of women as the butchers and processors of animals yielding, if not requiring, detailed anatomical knowledge has not been duly considered (but see, e.g., Jodry 1998). While some have suggested other reasons for why the image-makers were mostly males (e.g., Guthrie 1984, 2005), it seems extremely difficult, on the basis of the images and forms alone, to try to determine whether they are the result of a masculine or feminine culture or of a masculine or feminine hand. On what objective criteria may we base such inferences? Is there a "feminine way" of drawing a line or applying color? And even if we were to determine such a correlation today, how can we be sure that this would apply to 12 or 30,000-year-old images or forms?

However, among the themes that are represented in Paleolithic art, there are, in addition to the animals and geometric signs, the imprints of hands. These were made either by applying color directly onto a surface (Fig. 2) or by creating the outline of the hand by projecting color onto a hand pressed against the rock. When it is well preserved, such an image can be a quite precise reproduction of the maker's hand.

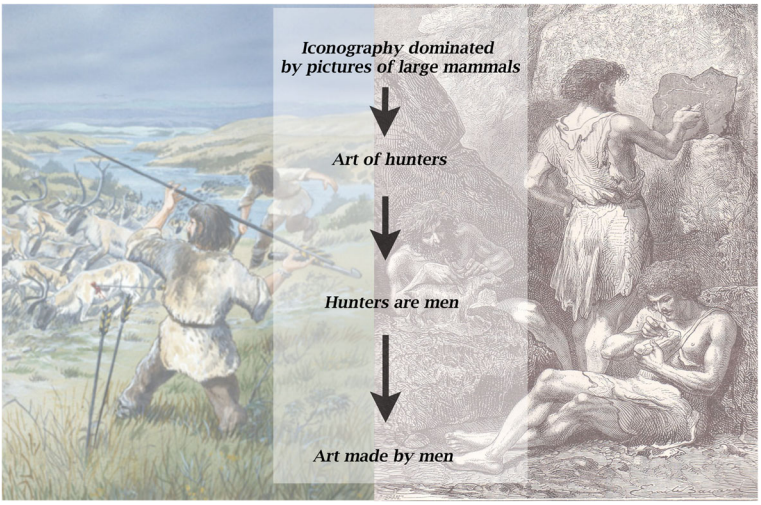

Fig. 1 Was Paleolithic art exclusively created by hunters and thus by men? (© pictures G. Tosello et E. Bayard in Figuier (1876))

Over the last 60 years, several attempts have been made to analyze these prints from a biological anthropological point of view by evaluating the width of the palm and the "delicate" or "robust" nature of the fingers in order to infer a sex of the maker, based on statistical results that have suggested that women generally have slimmer hands than men. Thus, in the famous Chauvet Cave (Ardèche, France), a panel of 48 prints "of small sizes" has been attributed to "the hand of a woman or adolescent" (Baffier and Feruglio 1998:2) (Fig. 3). Another panel of 92 handprints (the highest of which are 2.30 m from the floor level) is attributed to a man of a height of around1.80 m.

Recently, Snow identified the majority of handprints in the caves of Gargas and Pech Merle (in France), Castillo and Maltravieso (in Spain) as being made by females, at first (Snow 2006) comparing them to scanned images of the hands of modern men and

Fig. 2 Handprint and hand stencil: both types of hands painted in the European Paleolithic art (Chauvet Cave. © Photos C. Fritz/MCC)

Fig. 3 Some hand stencils or handprints may be attributed to short-sized or slight persons who could have been women (Chauvet Cave. © Photo C. Fritz/MCC)

women. According to his first and preliminary report, he suggested that the number of women making marks of symbolic import (at least the handprints) could be much higher than previously thought (Snow 2006). More recently, Snow (2013) has followed up his preliminary study in several ways. First, he increased his sample size to 32 handprints from Paleolithic cave sites, having selected only those that had the most robust images for measurement purposes. His analytical results suggest that 75 % of these hands were those of females. He notes the surprise that there is less overlap in digit ratios (the methodology based on the work of Manning, described below) between the male and female hands, suggesting a stronger pattern of sexual dimorphism in hand anatomy in the Paleolithic. The article also challenges some of the earlier research (e.g., Guthrie 2005) that suggested that the "smaller" handprints were those of adolescent males. Further, Snow emphasizes that universal assumptions must be tailored instead to local reference populations, although, for the Paleolithic hand images, we would find his interpretation more robust were he have also drawn upon a sample of Basques as a reference population (Snow 2013:749).

The new method that has been developed purportedly to allow a probabilistic attribution of biological sex is based on the work of the biologist J.T. Manning (e.g., Manning 2002). Manning has defined a digit ratio between the index finger and the ring finger that provides a key, he argues, to identifying the sex of any individual. During the first months of fetal life, different hormones seem to influence directly the development of these two fingers—estrogen for the growth of the index finger and testosterone in the case of the ring finger (Manning *et al.* 1998). A European male would seem to have a shorter index finger (average ratio 0.96), whereas a European female would have index and ring fingers of equal length (ratio close to 1). Any ratio with a figure between 0.96 and 1 then yields an indeterminate result (Fig. 4).

The Snow analysis, based on the Manning ratio, is not without its limitations and challenges, even with the most recently published details where, among other new aspects, he does draw on comparative baseline populations. Furthermore, while it allows us to infer a much more visible presence of "the female hand," it certainly does not straightforwardly lead to the identification of gender if we take gender to refer to a variety of social and cultural constructs and performative roles, which do not necessarily fall neatly, if at all, into the bipolar categories assumed in the contemporary world

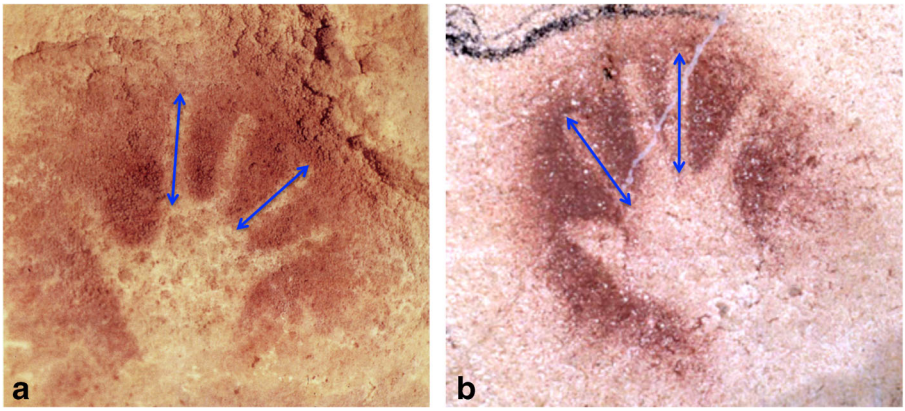

Fig. 4 Two cases of application of the Manning ratio (**a** Cave of Castillo: © Photo C. Fritz. **b** Chauvet Cave. © Photo C. Fritz/MCC)

(including by Snow 2013: 747) that are, however, no longer tenable. Nonetheless, given the striking invisibility, if not denial, of women as responsible for making cave art images, the very presence of females in the caves where images as well as handprints are found minimally "makes visible" Paleolithic women. This same "visibility" of both females and children has been presented as well in a series of publications by Sharpe and Van Gelder (e.g., Sharpe and Van Gelder 2004, 2006a, b, c; Van Gelder and Sharpe 2009) that analyze the finger flutings on soft clay primarily in the cave of Rouffignac (Dordogne, France). They too draw on the recent work by Manning and others (see below) as important to their methodology (see Sharpe and Van Gelder 2006a for the best description of their methodology).

It is of course tempting for prehistorians to try and determine the sex of the handprints in caves by measuring this well-known ratio, especially in the hopes that this might allow further hypotheses about gender and gendered practices without assuming the conflation of biological sex with gender, which is all too common. In 2005, J.-M. Chazine used this method to study the prints on the walls of Gua Masri II, in Borneo (Chazine and Noury 2006; Lamotte 2006). Thanks to a software developed by the archaeologist and computer specialist Arnaud Noury, two distinct and well-organized groups of hands could be identified: one male and one female, which could indicate that both sexes were producing the handprints there. It would be interesting to see if there were further patterns of differentiation in the making of handprints that might suggest a hypothesis about male and female roles in this instance of image-making. While these methods are strongly suggestive, they have real limitations. Whereas the biologist works on populations, the archaeologist has only a few prints to work with and no real hands, in the sense that we have strikingly few skeletal remains that could provide an anatomically based reference, especially at the level of a population. Depending on the forms and volumes of the walls and the projection angle of the pigments, the final outline of the hand may be deformed in relation to the original hand; notably its fingers may be lengthened. For us, the import of the identification that there may well have been females enacting images in caves, even if, at this point, we

are talking about the handprints, is that we can begin to envision a much more diverse group of image-makers than past accounts and illustrations have "told" us.

Other types of prints appear in caves that allow for a physical analysis of these individuals, namely bare footprints (Fig. 5). In France, about ten caves still possess these fragile clues, like in the Tuc d'Audoubert (Ariège) where we had the opportunity of carrying out an in-depth study (Bégouën *et al.* 2009). In this cave, at the end of the geological network that lies above an underground river, 650 m from the entrance, statues of bison were modeled from clay collected on the site in the center of a small room approximately 16,000 years ago (cal BP). There are no footprints directly around the statues, but there are over 300 prints along the 250 m leading toward them, along with other markings, displaced objects, and broken or abandoned cave bear bones. Many footprints are incomplete, but the most complete ones are small (estimated at around 22 cm on average). The size of these footprints once prompted one specialist in biological anthropology to conclude that they were those of adolescents (Vallois 1928). We could just as easily note that 22 cm corresponds to a 36/37 European shoe size (which is the shoe size of both female authors of this article!). In the Tuc d'Audoubert cave, attributing these footprints to women is relevant in conjunction with a series of convergent facts noted in this cave that allow us to infer that these prints and signs of activity along the cave galleries (including the drawings and clay statues) were those of just a small group of individuals in the course of a single journey (Bégouën *et al.* 2009). In other words, it is likely that the bison sculptors numbered one or more women among them (Fig. 6) (Tosello 2011).

Judging from these examples, it appears that a sex or perhaps even some sort of social attributes of the artist can sometimes be suggested—or at least, not ruled out—from anatomical comparisons based on visual observations, especially when combined

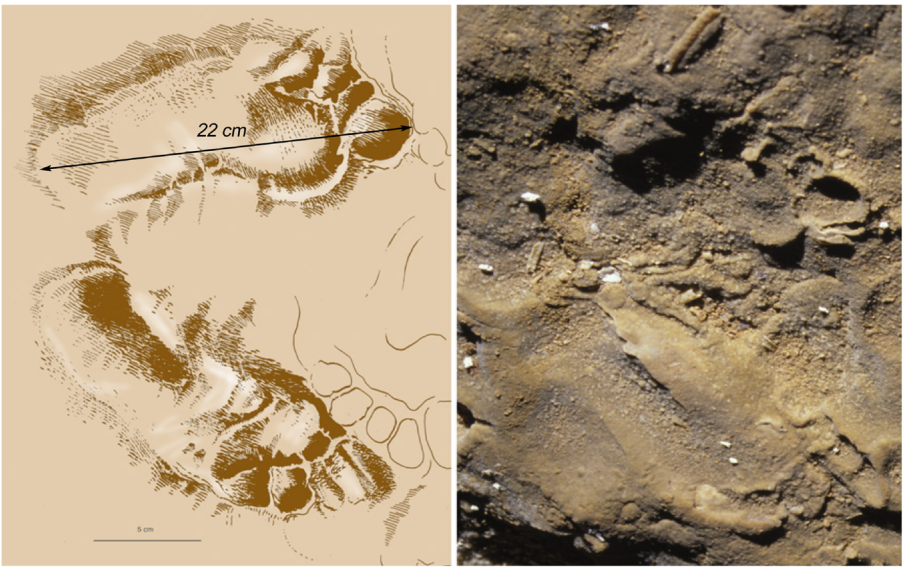

Fig. 5 Many footprints preserved on the ground of decorated caves may be attributed to slight and short-sized persons who could have been women (Cave of Tuc d'Audoubert. © Photo R. Bégouën. Tracing C. Fritz/G. Tosello in Bégouën *et al.* (2009))

Fig. 6 The clay bison (Cave of Tuc d'Audoubert. © Photo R. Bégouën)

with data derived from the archaeological context. However, these conclusions must always be treated with caution as they may be subject to bias from the values of the researchers, even if we are reflexive about them. The method based on the Manning ratio allows for as tantalizing a methodology yet available for hypotheses about the sex of the maker's hand, but it stills needs further validation, particularly through experimentation and comparisons with larger populations. Furthermore, even if we accept the results of the study on hands and feet, the presence of women in Paleolithic art making can sometimes be confounded with that of adolescents or even children. In fact, there is undeniable support for the presence of children in caves, for example, at the Tuc d'Audoubert, there are the footprints of a 3 or 4-year-old child found 600 m from the entrance, just before entering the chamber with the clay bison. Given the difficulty involved in making that journey, it is unlikely that this child would have travelled so far without help from accompanying adults. The child's presence was part of the entire group's journey to make those bison statues, some 50 m away. Despite his or her young age, we may imagine that the child had a role to play, even if simply observing, getting used to gestures, an atmosphere, and/or being a witness to a "ritual" that he or she would one day have to participate in or reproduce (Fig. 7).

Master or Apprentice? The Challenge of Understanding the Processes of "Making"

The question of the training of children in different aspects of everyday life was for a long time completely overlooked in the study of prehistory (e.g., Baxter 2005, 2006). For the Paleolithic, this is, in part, due to fact that the general theoretical level of research on Paleolithic societies did not take such social considerations into account (Gamble 1999:1–31). Occasionally, an author on prehistoric art would make a stylistic and technical distinction between a good quality drawing attributed to a master and a less elaborate one done by an apprentice. In the early years of research on Paleolthic art, there were suggestions about "centers where drawing was studied, where one could carve not simply on instruments but also practice, understand the shapes of animals"

Fig. 7 Were the statues of clay modeled by women? (© Illustration G. Tosello)

(Cartailhac and Breuil 1907: 27). This hypothesis was later developed into the idea of an art school: “in this case, one could imagine an attempt at making a copy next to the work of the master: it is the copybook” (Capitan and Bouyssonie 1924: 39).

However, such early commentaries were mainly value judgments that have not, over the past century, yielded much objective and empirical support. The notion of apprenticeship, especially in Paleolithic life, has been more rigorously studied in relation to lithic technology beginning in the early 1980s, notably with the pioneering work of Nicole Pigeot in the Paris Basin of France on the Magdalenian (Upper Paleolithic) site of Etiolles (Pigeot 1987). Inspired by this work, we have tried to use a similar methodology for the analysis of portable art images on bones that also date to the Magdalenian period (16,000–14,000 cal BP (Fritz 1999a; 1999b). As a simple definition, the concept of apprenticeship is to bring together a person with experience or expertise that will pass on his or her knowledge to another whom we call an apprentice (although a wider literature exists on this practice in ethnographic settings, see Lave and Wenger 1991; see also Dobres and Hoffman 1994; Dobres 1995, 2000). Today, we only have the archaeological objects themselves as a basis for suggesting the criteria that may have been used to define "poor" from "good" craftsmanship among the prehistoric engravers (Fig. 8). And, of course, whether these particular values can unproblematically be applied to a technique or achieved image is questionable. But, one can probe the nature of the craftsmanship, and it is toward that end that we have tried to observe with great precision (using an SEM microscope) the structures and mechanical properties of the various materials, namely of bones and flint tools. Afterwards, we followed two approaches: Firstly, a technological study of the engraved lines in order to recreate the movements and sequence according to which they were made, and secondly, a graphic analysis of the finished figure obtained by the engraver (Fritz 1999a: 37, Fig. 17).

Our experiments show that the movement of the tool on the surface of the bone is determined by the strict control of three angles: the tool angle when it first hits the bone, the front-working angle, and the side-working angle. All these angles must be around 45°. If not, errors can be seen on the bottom and the edges of the groove (e.g., scratches, side markings, irregular lines). The skill and hence the technical know-how of the

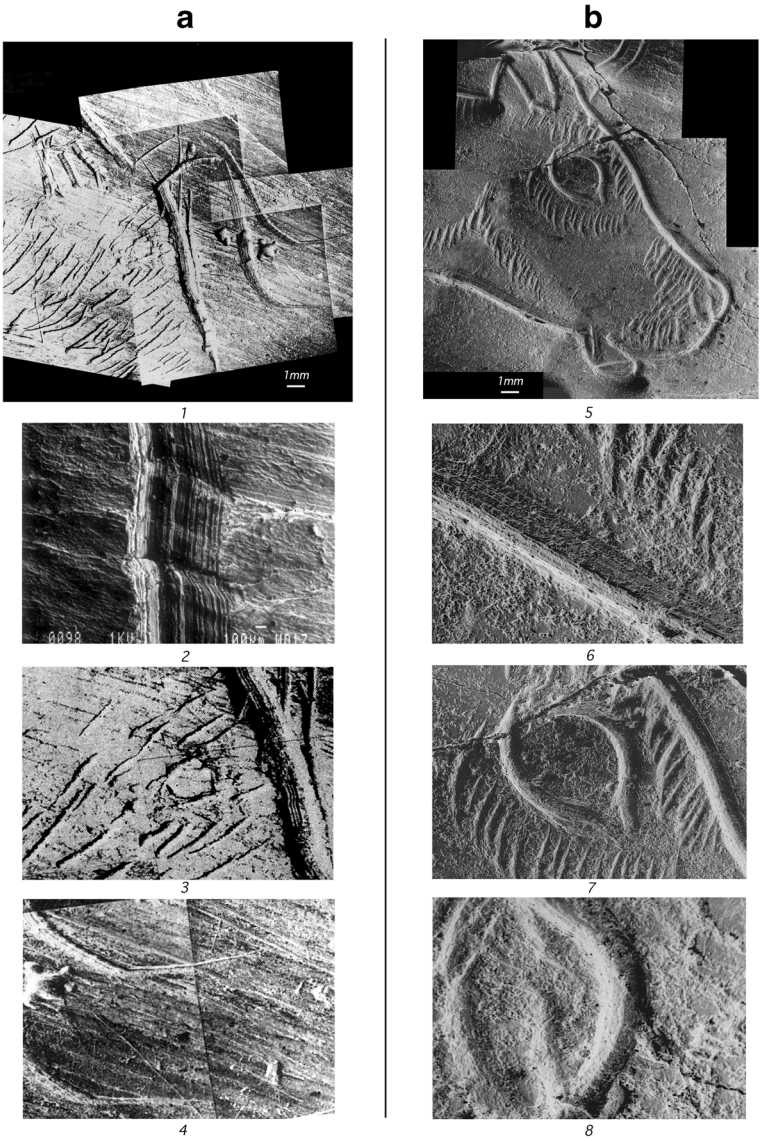

Fig. 8 The work of an awkward engraver or an apprentice (**a** *1–4*: an aurochs head from the cave of La Vache) compared with the work of a skilled artist (**b** *5–8*: a reindeer head from the Abri Morin). The techniques of both artists are better perceived thanks to scanning electron microscopy (SEM), *2* and *6*: note the outline of the forehead; *3* and *7*: in the treatment of the eye and the coat; *4* and *8*: with the curves of the horns of the aurochs and the muzzle of the reindeer (© SEM Microphotographics by C. Fritz)

engraver may be inferred by the frequency with which these mistakes were made. Nevertheless, we must also consider their location, their dimensions, the shape of the graphic field (circular, convex, concave), and the fibrous structure of bone, in general. Magdalenian engravers generally placed their figures in the direction of these fibers as the tool was then guided in its movements. When operating a cut that was perpendicular to these bone fibers, the material offered higher resistance; the engraver then had to

exert more pressure and controlling the tool became far less predictable for an inexperienced technician. Very often, these difficulties can be observed in the curved lines. With the help of a technical study, the stylistic analysis of the drawing is particularly revealing: framing, figure proportions, and line regularity. All these clues help to support our first impressions regarding the relative skill of the maker based on the engraving techniques.

Many examples have the microscopic technical characteristics that we could expect from the work of a beginner: superficial engravings, bad tool angles, poor appreciation of the resistance of the bone itself, slips of the tool, clumsy framing, and/or average drawings (Fig. 9). Furthermore, for some of them, the bones or the raw material supports themselves could be called "second rate." They are rejects, like this piece of shoulder blade showing the marks where a disc was cut out (Fig. 9 (1–3)). Another case is somewhat different as there are more details, which suggests that the artist was more skilled than those of the previous figures (Fig. 8a). Nevertheless, some mistakes (scratches, skid marks) and the inability to make a curved line in a single movement suggest to us that this artist was not so experienced. Overall, these objects seem to point toward personalities at different levels of technical abilities. Some were beginning to master these engraving techniques (Fig. 8a) but not the drawing skills; one of them had fewer problems with drawing but needed to improve his or her engraving skills (Fig. 9 (5)). These works of various origins seem to indicate that the way in which the actual graphic field was used was also part of the engraver's skill level. As in the case of flint, the experienced craftsmen had access to the best quality whereas the clumsy beginners practiced on second-rate materials: uneven surfaces and carving rejects. The training of young engravers went even further as the manner in which drawings that were accomplished followed certain rules. Thanks to the study of the superposition of lines using an SEM, our understanding of the sequence of movements shows that the order in which the various elements were engraved was the same throughout the Magdalenian period (Fritz 1999a: 151). Movements were from the front to the rear of the animal being engraved: The head systematically came first, starting with the horns or antlers, then the chest, the line of its back, the front legs, the stomach line, the back legs, and finally its rear end and tail. Once the outline was complete, the engraver made its internal attributes (fur, signs, eyes, nostrils) but always after the outline.

Geometric patterns were conceived and treated using a similar procedure as for the animal images. Detailed microscopic analysis confirms this uniform mode of execution. From one site to another in a given area, the Magdalenians possessed a single mental concept with very little significant variation over space and time. This observation is particularly of interest in contrast with the following period, the Azilian (13,000 cal BP), which is considered to be at the end of the Ice Age and associated "cultures." On the Azilian engraved bones that we studied with the same methods, we noticed a discontinuity in such movements and the absence of such stylistic rules. This is suggestive that deep changes occurred that were parallel to other thematic and graphic modifications, visible on what are known as the Azilian objects (D'Errico 1994; Barbaza *et al.* 1999). We could make the case that this shift between the two periods is rooted in a new cultural setting, in changing parameters for the making of engraved objects, and in a different community of practices.

A technique can be defined as a certain theoretical knowledge that is applied through the use of models (Seris 1994). A technique must therefore have a set of norms that are

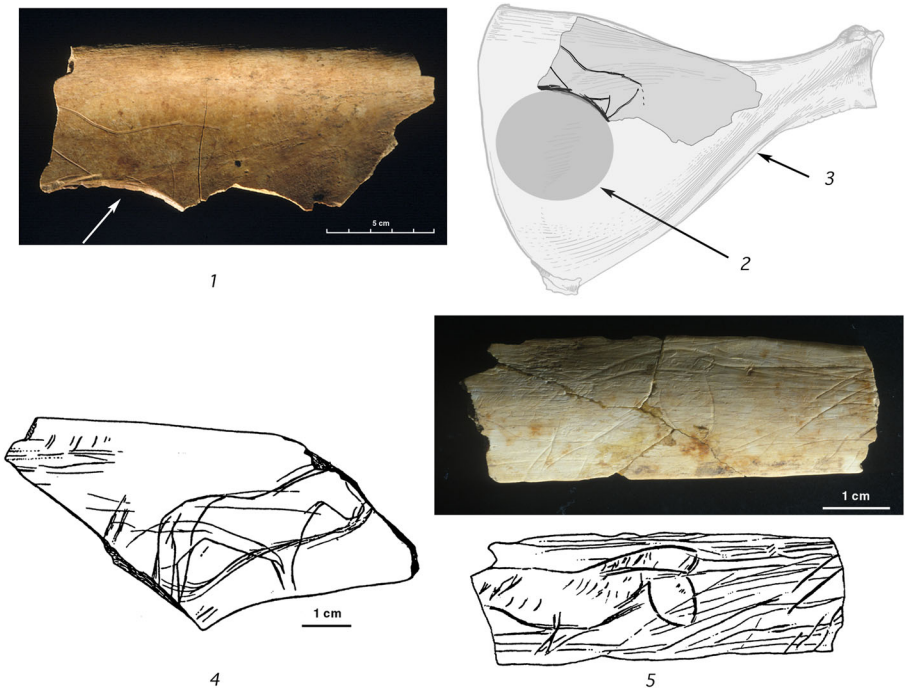

Fig. 9 Magdalenian engravings on bone considered to have been the works of "apprentices" or of inexperienced engravers: *1* an animal from the cave of Mas d'Azil engraved on a fragment of a shoulder blade, *2* the placement of the bone disc cut before the engraving, *3* the location of the engraved fragment on a reindeer shoulder blade (© photo and drawings C. Fritz), *4* the horse engraved on a diaphysis fragment from the Abri Morin (© drawing P. Laurent in Deffarge, *et al.* (1975)), *5* the horse engraved on a rib fragment from the cave of La Vache (© photo and drawing after C. Fritz (1999a))

cultural and stylistic and also a set of physical and mechanical norms that reflect the constraints inherent in the materials used. Furthermore, mastering a technique implies a form of acquisition by "showing, imitation, practice" (Seris 1994:71). We may well consider that the technique of engraving on bones or other materials is not inborn but has to be acquired. If we accept the function of the "artistic object" in "primitive societies" (Lévi-Strauss in Charbonnier 1961) as well as a technical approach to the processes involved, we can artificially divide the various steps of apprenticeship. On one hand, there is acquisition of technical know-how and on the other hand, the transmission of the social codes governing this artistic production. If we follow this line of thought, we can imagine that portable art (and probably art in general) was codified and strictly controlled by a social group during the Magdalenian. As a consequence, we can also imagine at least some sort of specialization of the individuals in charge of this production in order to guarantee the proper transmission of the social codes that regulated these art forms. Based on this hypothesis, how may we envisage this specialization and this transmission of both codes and skills?

The idea of apprenticeship remains something of a mystery: Will we ever know how it might have operated? If the training of the apprentice was both technical and initiatory, we may envisage the idea of strong peer pressure to ensure that the transmission of such symbols would take place in accordance to established rules.

Unfortunately, this aspect of Magdalenian society has left us with no obvious material evidence. The apprentices may have practiced on perishable materials, such as wood or the ground itself, which have now vanished. Did the young engravers have immediate access to "good" bone material or did they have to wait to reach a certain age? The role of the skilled engraver and that of the beginner remains an open question. How were they chosen? Were they next of kin or "gifted" adolescents? Did the skilled engravers have a privileged position within the group or were they simply "craftsmen" (or indeed, craftswomen)? Whatever the case may be, we may suppose that they at least held a certain cultural or even spiritual power linked to their role as keepers of the knowledge of graphic codes and symbols.

Tradition, Imitation, and/or Invention? The Challenges of Interpretation

Paleolithic art, then, is an art of traditions, traditions transmitted from one generation to the next. The artist could not express himself or herself "freely," as we would perhaps put it, but worked within the parameters set by the social group. We would not say, for example, that the artist was primarily working to express his or her ego but, rather, was more of a guardian of ancestral knowledge that he or she would try to transmit respectfully. That seems to be the likeliest scenario, as we do not have another highly plausible way to explain how the details and graphic conventions could have remained in place over centuries and even millennia in certain areas. One example might be the case of the engraved "motif" of a hind (female deer) with the "scratched throat design" that is typical of images made primarily in the Cantabrian region of Northern Spain. The elegant (to us) manner in which the animal is represented, with a thin elongated muzzle, one ear tilted forward and the other back, the throat covered with thin lines, was made quite frequently in the years 18,000 to 16,000 cal BP, both on bones or plaquettes and on cave walls. Sometimes referred to as a "stereotype" or an "iconographic archetype," this hind has become an emblem of the culture of the Lower Cantabrian Magdalenian. Such figures are not known outside this specific region. However, in the Marsoulas cave, 400 km to the east in the central Pyrénées of France, we find an engraved head of a hind that reminds us of the Cantabrian hind, even though it is not completely similar. The ears are not pointed at a different angle, the muzzle is wider but the throat is covered with long lines, but with deeper grooves than on the Spanish hinds. Nevertheless, there is a distinct "family likeness" about the figure (Fig. 10). It looks as if the engraver at Marsoulas tried to reproduce an "exotic" image, one that was seen elsewhere or described by another person, and adapted it to his or her own style and technical expertise. It is merely a hypothesis, but one of particular interest as there are other paintings and carvings in Marsoulas that point to a Cantabrian influence. On the main panel, a large red bison (1.70 m long) engraved and outlined in black, can be compared to certain bison on the Great Ceiling of Altamira in Cantabria. The dimensions, the color, the use of engraving and paint, certain details such as the black triangle at the base of its hump, all these elements connect the animal figures within these two caves. Unlike the hind, we cannot talk about imitation. Indeed, it would be more appropriate to talk about the same inspiration, the same techniques even if the artist in Marsoulas did not have the talent of the apparent "masters" of Altamira. This is unlikely to be a mere coincidence, as there are only two such bison in Marsoulas out of a total of 120 that we have catalogued there. These clues of a

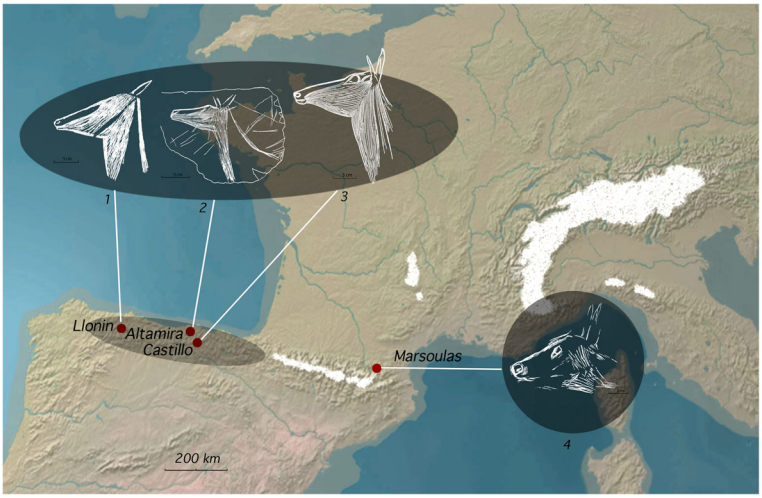

Fig. 10 Regional tradition in the art of the Magdalenian (ca. 18,000 to 16,000 cal BP): Hinds with the "scratched throat" are known only on the north coast of Spain with the exception of a hind engraved in the cave of Marsoulas 400 km westward (*1*: © tracing J. Fortea, *2*: © tracing M. Almagro in Almagro Basch (1976), *3*: © tracing H. Breuil in Alcalde del Rio *et al.* (1912), *4*: © tracing C. Fritz /G. Tosello)

Cantabrian influence (Fritz and Tosello 2004, 2005) cast a shadow over the idea of a unique style in this one Pyrenean cave of Marsoulas and constitute an innovative element as they introduce a little piece of the wider cultural world into an otherwise local cultural manifestation.

Forty kilometers east of Marsoulas, in the cave of the Mas d'Azil, a spear thrower was discovered, carved out of reindeer antler, showing a young female ibex on the end with its head turned toward its back on which birds are resting (Fig. 11 (1)). Dated to around 16,000 cal BP, this work is typical of a type of spear thrower that has been found throughout the Pyrénées and in which the hooked end is carved with an animal with its legs brought together on the same handle. At the Mas d'Azil, the artist decided to choose a position for the animal that offered the best compromise between the theme and the particular shape of the reindeer antler that he or she had selected. The only way of including the head was by making it face backwards (unless the shape of the antler itself suggested this position, typical of an ibex or goat). Whatever the case may be, this clever solution was adopted by another artist—or was done again by the Mas d'Azil artist—with a spear thrower found in the cave of Bédeilhac, 30 km from the Mas d'Azil, but with some noteworthy changes (Fig. 11 (2)). The legs of the ibex were folded and carved as a bas-relief, thereby saving the artist the complicated task of having to detach them from the rest of the body. The birds were reduced to a symbolic representation that would be incomprehensible without the example from the Mas d'Azil to understand it. Another discovery made in the cave of La Garma in Cantabria is even more remarkable in this inquiry into symbolic codes and manufacturing strategies (Arias *et al.* 1999). It is a flat bone, a rib, transformed into a so-called dagger, for which the handle has been carved in the manner of the ibex with the turned head (Fig. 11 (3)). The artist had a further problem to overcome: The initial model was in three dimensions whereas the La Garma bone had the shape of a blade, two flat sides separated by a thin edge (Fig. 12). Despite this major obstacle, the sculptor of La

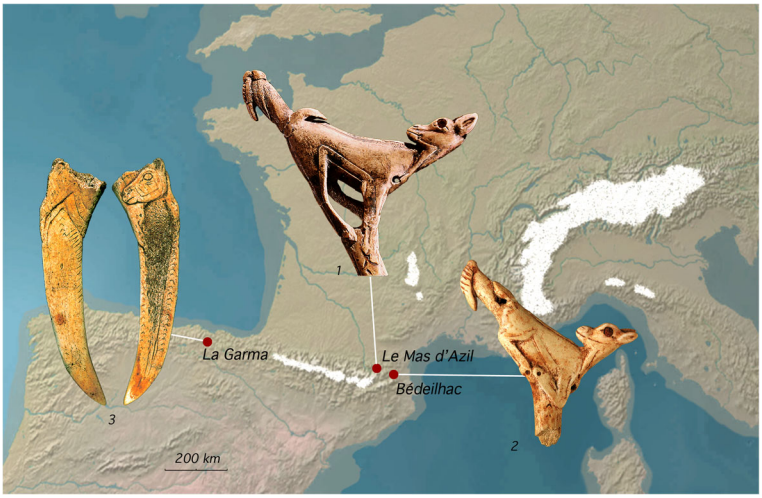

Fig. 11 Influence and imitation in the Magdalenian art (ca. 16,000 cal BP): The theme of the fawn turning its head backward shows a wide geographical distribution although with considerable differences (*1*: © photo P. Arias, *2*: © photo SESTA, *3*: © photo C. Fritz)

Garma carried out his or her project, using both sides and the edge to show the ibex. The animal cannot be seen all at once: We have to turn the object around to see the work in its entirety. Of course, we do not have any documentation to further support the proposition that these three works follow our scenario for the existence of an agreed upon code for making such objects. There is a great deal of missing information, most notably a precise timescale that would enable us to fix these three pieces in time. What we do know is that the artists behind these works belonged to/participated in the same cultural group (in the archaeological sense of the word). It is quite conceivable that the most spectacular work, the fawn of the Mas d'Azil (that combines both the greatest

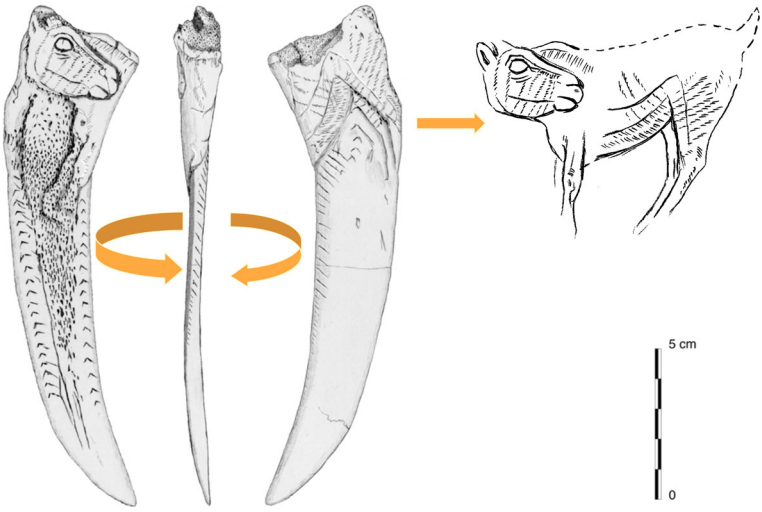

Fig. 12 Cave of La Garma: a fawn engraved and carved in low relief on the handle of a dagger made on a bone rib (ca. 16,000 cal BP) (© tracing P. Arias)

technical challenges and the greatest technical skills), illustrates the initial concept. The example that we find in Bédeilhac is suggestive of a desire to imitate that preserves the essential lines of the original but does away with the more complicated part of its execution. By using the Pyrenean theme as a source of inspiration, the artist who made the bone "dagger" found in La Garma was able to transform it in order to adapt it to a different kind of graphic field that might have been more familiar and hence gave it a new use (Fig. 13). Assuming that the La Garma object was made on site or in the Cantabrian region, the maker there appears to have used a distant concept to create a new object. How can we explain these similarities or changes, observed at both neighboring and more distant sites that seem to take place in the same time period?

Since the 1970s, many works have shown that the Paleolithic hunters of different European regions were not isolated but belonged to a network of exchanges (among others cf : Wobst 1976; Bahn 1982; Conkey 1990; Taborin 1992; Simonnet 1996; Buisson *et al.* 1996; Alvarez Fernandez 2002; Sieveking 2003; Vanhaeren and d'Errico 2003; Corchón 2004; Fortea Pérez *et al.* 2004a, 2004b; Fritz and Tosello 2005; Fritz *et al.* 2007; Sauvet *et al.* 2008; Bourrillon *et al.* 2012)). In fact, Gamble (2013) has recently argued that (and why) such connections were crucial to the ability of humans to be "effective world settlers." He describes this as "the imaginative ability to "go beyond" and to create societies where people lived apart yet stayed in touch", and we can only imagine—and work to document—how the Paleolithic arts were both integral to and the product of such processes. We do know that groups would meet, sometimes at aggregation sites (Conkey 1980, 1984, 1992) such as Le Mas d'Azil or Altamira. Such contacts, as attested by the widespread distribution of raw materials (including

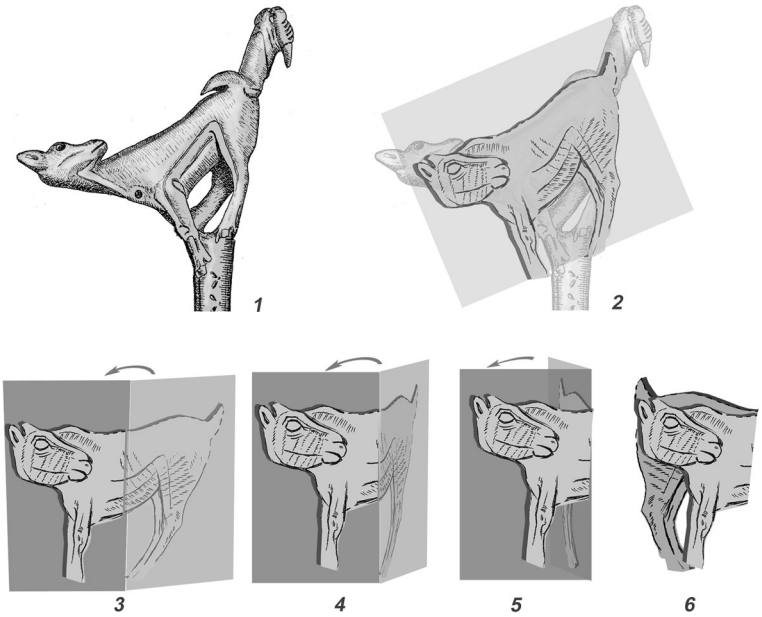

Fig. 13 Influence and imitation in the Magdalenian art (ca. 16,000 cal BP): the fawn carved in three dimensions on reindeer antler of Mas of Azil (*1*) might have been a model for the artist of La Garma (Cantabria), who imitated the attitude of the animal (*2*) while adapting it to a flat bone. This choice demands the body to be "folded" in two parts (*3* to *6*). (*1*: © drawing Péquart in Pequart (1960–1963). *2* to *6*: © drawings G. Tosello)

flint) or objects, were necessary, minimally, for the genetic health and diversity of these populations. These are important sites for a better understanding of information flow and social networks among these populations (e.g., Whallon 2006; Whallon 2011). During these encounters, some individuals would likely change clans or families, taking with them their personal belongings, their unique techniques, and their know-how, all perhaps not well known to the group welcoming the individuals. Perhaps an artist would see or hear about an object, a theme, and a new technique and take that information back to his or her people or even try to use it for himself or herself. In the end, the archaeological consequence was the arrival of an element of renewal or of something exotic, a little bit of innovation and yet without witnessing any fundamental changes. These things seen elsewhere and then adapted or transposed seem to indicate a very low level of innovation among Paleolithic artists, yet within a framework of notable artistic accomplishment and production of a rich and varied material and visual culture. What is striking is that in this world of Paleolithic art and material production with many different recognizable "types" of objects (e.g., *contours decoupés*, *rondelles*, *baguettes demi-rondes*, etc.), there was at the same time recognizable standardization for the making of such objects and images (e.g., Buisson *et al.* 1996).

There are a few telling examples. Thus, in the cave of Chauvet-Pont d'Arc, one of the oldest known cave art sites, a group of bison is represented by four frontal views of heads, all aligned vertically on a rocky edge on the angle of a panel (Clottes 2003:137–142; Tosello and Fritz 2005:168–169). Each head is expressed by certain defining lines and corresponds to a specific formula for simplification: two black dots for the eyes, a mass for the hump surrounded by curved lines for the horns (Fig. 14). A little further on, another bison head with the same diagrammatic representation is also set on a rocky ledge, but just beyond it is a body seen sideways. In front of this fresco, the viewer has the impression that the animal is both standing in front of and looking at the spectator (Fig. 15). Such graphic compositions are exceptional among cave art; there are other frontal views of heads (often bison) as well as an important group of decorated objects

Fig. 14 Invention in Aurignacian art (ca. 36,000 cal BP): a vertical frieze of bison heads in frontal view, drawn on a ridge of the wall (Grotte Chauvet-Pont d'Arc) (© Photo and drawing C. Fritz/MCC)

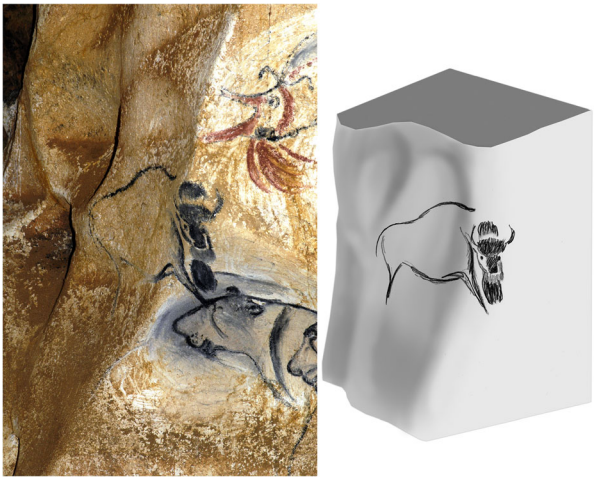

Fig. 15 Invention in Aurignacian art (ca. 36,000 cal BP): a bison with the head in frontal view and the body in profile, drawn on a dihedron of the wall in the Salle du Fond (Chauvet-Pont d'Arc Cave. © Photo and drawing C. Fritz/MCC)

from the Cantabrian Magdalenian with figures of ibex, as well as some unique pieces such as the bone from El Valle cave with dorsal representations of deer (Barandiaran 1973). But nowhere else do we find such a daring innovation and ingenious layout as at Chauvet-Pont d'Arc. Much more recently, around 14,000 cal BP, in the Périgord of France, a horizontal or curved line appeared under the legs of certain animal figures (Fig. 16). This detail appears to us as a small revolution: For the first time, the engravers

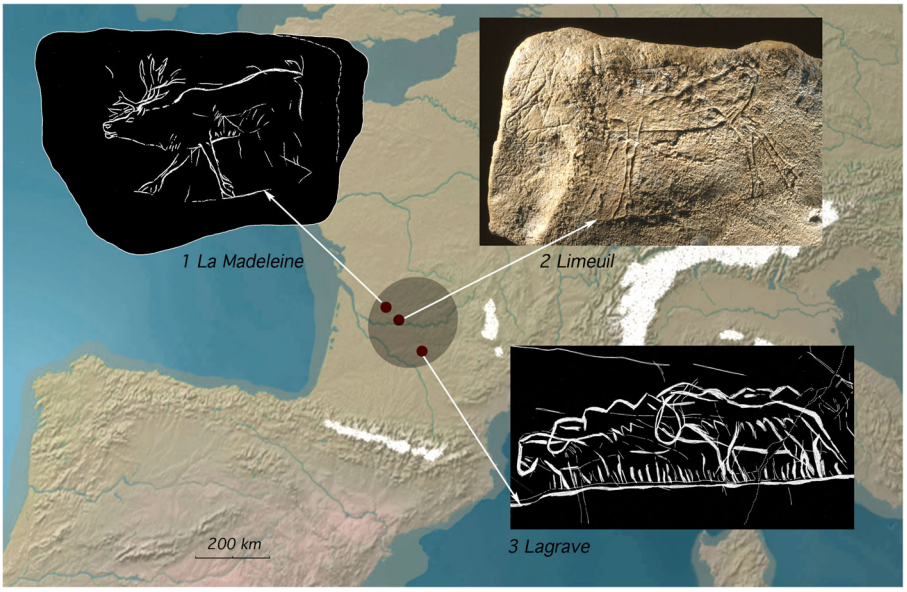

Fig. 16 Invention in Magdalenian art: the representation of a « ground line » under the hooves of animals appears for the first time and simultaneously on engravings from two different regions: in the Périgord and in Quercy (of France) ca. 14,000 cal BP (*1*, *2*: © tracing and photo G. Tosello; *3*: © tracing Ipiens *et al.* (2001))

placed their subjects on the ground, thereby also defining what we might take as the concept of a background. Indeed, for nearly 20,000 years, Paleolithic art produced thousands of animals that seemed to evolve in an undefined graphic space. There are a few figures that can be seen running or walking along cracks or *plaquette* edges, but in the noted case, the artist conceived and then drew a ground line with no reference to a natural element. On the blocks and *plaquettes* of the sites of Limeuil and La Madeleine, this use of an explicit ground line appeared with only a couple of animals, with the exception of a herd of five reindeer all walking on the same ground (Tosello 2003:125). Another more spectacular example is found on the wall of the small cave of Lagrave (Lot). There, the artists drew a herd of walking horses over a length of 1.37 m. In the center, we observe only "manes in the form of overlapping lines and a multitude of vertical lines depicting a cluster of legs" (Ipiens *et al.* 2001:107). A line depicting the ground was carved deeply and is clearly visible below the frieze (Fig. 16 (3)). On the right, an entire horse was represented at a slightly larger scale than the others, as if it had detached itself from the rest of the group and was closer to the viewer. The indication of successive layers creates a graphic space that obeys the laws of perspective. These innovations were not a success; in fact, such lines for the ground and group compositions are limited to the Périgord region: a local innovation? We add that they occur very near the end of the period of Paleolithic art.

Conclusion

Given the vast geographic area covered and the considerable duration of this phenomenon in Europe, the Paleolithic artists undoubtedly had various destinies and roles. The genders of the artists are, not surprisingly, difficult to define, essentially because of the lack of objective criteria on which to base that distinction or to ascertain an attribution, to say nothing of the complications and potential complexities of what gender means or meant at those times and to those people. Yet, it is clear that for 150 years, every generation has either tried to ignore or lessen the role of women by putting forward arguments taken from historic or current societies. Comparisons with ethnographically observed hunter-gatherers are indeed founded on a theoretical basis but have certain limitations as well. Yet when considering the spiritual or ideological domain (and such is the case for Paleolithic art), we must keep in mind that other types or forms of social and cultural behavior may have existed; we cannot be limited or tyrannized by the ethnographic information (Wobst 1978). Thus, if we consider that the role of the creator or maker of images and symbols presupposes a certain ease with artistic skills, what we today would call a "gift," then we should entertain the possibility that a group would not automatically block such a gift to develop in the interest of the community, even if such a gift belonged to someone of varied social identities and perhaps especially if this budding talent were noticed at an early age. Even though we should not necessarily attribute to past societiesm a more developed sense of equality that exists in some of today's societies, there is little evidence that would exclude the idea that prehistoric women played an important part in artistic creation. The techniques that could lead to inferences regarding gender based on the biological anthropological analysis of hand and foot prints are imperfect and limited, but these analyses inject into our own presuppositions the possibility, if not the probability, that both men and women, as

well as perhaps youths, were participants and practitioners of what we call Paleolithic art. Our previous and predominant assumptions based on the "common sense" and subjectivities of the twentieth and twenty-first centuries that it "must have been male artists" should be subject to the same rigorous inquiry as is expected for all of our archaeological research. Here, we have offered some ideas and ways of reimagining the artistic practices that could realistically have included varied social personae, including those based on and derived from recognizable social roles and skills.

Research on the modes of transmission of artistic knowledge and practices suggests that Paleolithic societies were notably conservative, which would seem logical considering that the graphic form of these images conveyed meanings. Thus, for those meanings to endure, the codes (and all that they included) had to remain fairly constant. This stability—a stability within a varied repertoire—ends along with the Ice Age when other mental and presumably culturally meaningful patterns then emerge. The important role given to the respect of tradition had another logical consequence: Radical inventions or innovations were rare and not widely diffused. We have the impression that the power for individual invention certainly existed throughout all these groups but that it was consistently held back, perhaps treated with circumspection by the community. The "artist" was kept under some constraints, and his/her imagination was channeled: He or she could express something new seeing that, in most cases, it would be of little potential consequence as it would then not be copied or diffused. There are some exceptions, probably due to strong personalities or small groups who managed to impose their views. A moderate and permanent renewal of art thus occurred by borrowing, adapting, or imitating certain works that in some way appear as "foreign." Such borrowing is identifiable in archaeological terms as the exchanges among these groups were dense and frequent. Periods of relative isolation of such communities were probably better suited to the emergence of stylistic inventions or new themes as these groups and the individuals within them then had to rely on their own conceptual resources. In terms of innovative ability, the Paleolithic artist would have been first and foremost influenced by contacts outside his or her group. The artist's personality would have been more easily made manifest outside the norm-inducing influence exercised by the cultural community as a whole.

In the end, we would be the first to note that we have not here empirically demonstrated "the" role(s) of the artists in Paleolithic society nor specified "identities" in some positivist sense. Rather, we have begun to explore the ways in which we might approach the social roles and practices that led to the corpus of Paleolithic art as we know it today. Others have begun to do this for other kinds of material culture, such as Weedman's work (Weedman 2002; Weedman Arthur 2010) on the intersection of skill levels, age, and gender among contemporary stone tool making in Ethiopia. We, too, would hope to reframe some of the understandings of Paleolithic art in terms of the effects of age, experience, and other social identifiers on the making and reproduction of objects and images in the Upper Paleolithic of Europe. Given that so much of Paleolithic art is apprehended in a macroscale framework and so often subordinated to a global vision of western art-making practices, we hope here to have interjected some lines of reasoning and emergent understandings of identity that might provide a baseline for thinking about the intersection of such social features as skill levels, gender, and the power of traditions that may well have lain behind what we have today as the Paleolithic arts.

Acknowledgments The two principal authors would like to thank L. Hinton for the original translation and Meg Conkey for additional translation and authorship. This article was written thanks to the financial support of French National Research Agency (ANR) as part of the program "PREHART." We also thank the journal editors for their patience and especially the several reviewers who offered crucial and constructive advice.

References

Adovasio, J. M., Soffer, O., & Page, J. (2007). *The invisible sex: uncovering the roles of women in prehistory.* Washington DC: Collins-Smithsonian Books.

Arias, P., González Sainz, C., Moure, A., & Ontañón, R. (1999). *La Garma, Un Descenso al Pasado*. Santander: Catálogo de la exposición. Gobierno de Cantabria y Universidad de Cantabria.

Alcalde del Rio H., Breuil H. Sierra L. (1912). *Les cavernes de la région cantabrique*, Monaco, Veuve A. Chêne ed., 265 p

Almagro Basch, M. (1976). Los omoplatos decorados de la cueva de El Castillo, Puente Viesgo (Santander). *Monografias Arqueologicas,* 2, Museo Arqueologico Nacional, Madrid, 99 p

Alvarez Fernandez, E. (2002). Perforated *Homalopoma sanguineum* from Tito Bustillo (Asturias): mobility of Magdalenian groups in northern Spain. *Antiquity, 76*(293), 641–646.

Appelaniz, J. M. (1984). L'auteur des grands taureaux de Lascaux et ses successeurs. *L'Anthropologie, 88*(4), L 539–561.

Baffier, D., & Feruglio, V. (1998). Premières observations sur deux nappes de ponctuations de la grotte Chauvet (Vallon-Pont-d'Arc, Ardèche, France). *International Newsletter on Rock Art, 21*, 1–4.

Barandiaran, I. (1973). *Arte Meuble del Paleolitico Cantabrico.Monografias Arqueologicas* No. 14, Universidad de Zaragoza, Zaragoza.

Bahn, P. G. (1982). Intersite and inter-regional links during the Upper Paleolithic : the Pyrenean evidence. *Oxford Journal of Archaeology, I*(3), 247–268.

Barbaza, M., Fritz, C., & Pomiès, M. P. (1999). *Une pendeloque gravée azilienne dans la grotte de Troubat (Hautes-Pyrénées)* (pp. 141–174). LIII: Bulletin Société Préhistorique Ariégeoise.

Baxter, J. E. (2005). *The Archaeology of Childhood*. Lanham, MD: Rowman-Littlefield.

Baxter, J. E. (Ed.). (2006). *Children in action: perspectives on the archaeology of childhoods. Archaeological Papers of the American Anthropological Association, No.15*. Hoboken, NJ: Wiley Subscription Services.

Bégouën, R., Fritz, C., Tosello, G., Clottes, J., Pastoors, A., Faist, F., avec la collaboration de Bourges, F., Fosse, P., Langlais, M., & Lacombe, S. (2009). *Le Sanctuaire Secret des Bisons. Il y a 14000 ans, dans la Caverne du Tuc d'Audoubert*. Paris: Editions d'Art Somogy et Association Louis Bégouën.

Bolger, D. (Ed.). (2013). *A companion to gender prehistory.* Malden, MA and Oxford, UK: Blackwell.

Bourrillon, R., Fritz, C., & Sauvet, G. (2012). La thématique féminine au cours du Paléolithique supérieur européen: permanences et variations formelles. *Bulletin de la Société Préhistorique Française, 109*(1), 85–103.

Brumbach, H., & Jarvenpa, R. (1997). Woman the hunter: ethnoarchaeological lessons from Chipewyan life cycle dynamics. In C. Claassen & R. A. Joyce (Eds.), *Women in prehistory: North America and Mesoamerica* (pp. 17–32). Philadelphia: University of Pennsylvania Press.

Buisson, D., Fritz, C., Kandel, D., Pinçon, G., Sauvet, G., Tosello, G. (1996). Analyse formelle des contours découpés de têtes de chevaux: implications archéologiques. In Delporte,H. et Clottes,J. (dir.), *Pyrénées Préhistoriques, Arts et Sociétés.* Actes du 118^{e} Congrès National des Sociétés Historiques et Scientifiques, C.T.H.S., Paris, pp. 327–340.

Capitan, L., Bouyssonie, J. (1924). *Un atelier d'art préhistorique: Limeuil, son gisement à gravures sur pierres de l'âge du renne*. Publications de l'Institut International d'Anthropologie, 1, Librairie Emile Nourry, Paris

Cartailhac, E., & Breuil, H. (1907). Les oeuvres d'art de la collection de Vibraye au Muséum National. *L'Anthropologie, 1–2*(XVIII), 1–36.

Charbonnier, G. (1961). *Entretiens avec Claude Lévi-Strauss*. Plon Julliard, Paris: Collection les Lettres Nouvelles.

Chazine, J.-M., & Noury, A. (2006). Sexual determination of hand stencils on the main panel of the Gua Masri II cave (East Kalimantan-Borneo-Indonesia). *International Newsletter on Rock Art, 4*, 21–26.

Clottes, J. (2003). *Chauvet Cave, the art of earliest times*. Salt Lake City, UT: University of Utah Press.

Cohen, C. (2003). *La Femme des Origines*. Paris: Images de la Femme dans la Préhistoire Occidentale. Belin Herscher ed.

Cohen, C. (2005). *La moitié "invisible" de l'humanité. Colloque Mnemosyne, Lyon, IUFM, 8 mars 2005.*

Conkey, M. W. (1980). The identification of prehistoric hunter-gatherer aggregation sites: the case of Altamira. *Current Anthropology, 21*(5), 609–630.

Conkey, M. W. (1984). To find ourselves: art and social geography of prehistoric hunter-gatherers. In C. Schrire (Ed.), *Past and Present in Hunter Gatherer Studies* (pp. 253–276). FL.pp: Academic Press, Orlando.

Conkey, M. W. (1987). New approaches in the search for meaning? A review of research in "Paleolithic art". *Journal of Field Archaeology, 14*, 413–30.

Conkey, M. W. (1990). L'art mobilier et l'établissement de géographies sociales. In J. Clottes (Ed.), *L'art des objets au Paléolithique supérieur: les voies de la recherche. Colloque de Foix-Le Mas d'Azil (1987)* (pp. 163–172). Paris: Direction du Patrimoine.

Conkey, M. W. (1991). Contexts of action, contexts for power: material culture and gender in the Magdalenian. In J. Gero & M. Conkey (Eds.), *Engendering Archaeology: Women and Prehistory* (pp. 57–92). Oxford: Blackwell.

Conkey, M. W. (1992). Les sites d'agrégation et la répartition de l'art mobilier, ou: y a-t-il des sites d'agrégation magdaléniens ? In J. Rigaud, H. Laville, & B. et Vandermeersch (Eds.), *Le Peuplement Magdalénien, Paléogéographie Physique et Humaine. Actes du Colloque de Chancelade, 10–15 octobre 1988, Éditions du CTHS, Paris* (pp. 19–25).

Conkey, M. W. (1997). Mobilizing ideologies: Paleolithic "art", gender trouble, and thinking about alternatives. In L. Hager (Ed.), *Women in Human Evolution* (pp. 172–207). London and New York: Routledge.

Conkey, M. W., & Spector, J. (1984). Archaeology and the study of gender. In M. Schiffer (Ed.), *Advances in Archaeological Method and Theory, 7* (pp. 1–38).

Corchón, M. S. (2004). Europa 16500–14000 A.C.: un lenguaje común. In P. Arias Cabal & R. Ontañón Peredo (Eds.), *La Materia del Lenguaje Prehistórico* (pp. 105–126). Instituto de Prehistoría, Santander: El Arte Mueble Paleolítico de Cantabria en Su Contexto.

Deffarge, R., Laurent, P., & de Sonneville-Bordes, D. (1975). Art mobilier du Magdalénien supérieur de l'Abri Morin à Pessac-sur-Dordogne (Gironde). *Gallia Préhistoire, 18*(1), 1–64.

Delluc, G. (2012). Nutrition et sexualité au Paléolithique. *Médicine Clinique et Endocrinologie diabète. Hors series. Mars, 2012*, 21–28.

D'Errico, F. (1994). *L'art gravé azilien. De la technique à la signification*. 31e suppl. à *Gallia Préhistoire*, CNRS éditions, Paris.

Dîaz-Andreu, M., & Lucy, S. (2005). *Introduction. The archaeology of identity. approaches to gender, age, status, ethnicity and religion* (pp. 1–12). Oxon and New York: Routledge.

Dobres, M.-A. (1995). Gender and prehistoric technology: on the social agency of technical strategies. *World Archaeology, 27*(1), 25–49.

Dobres, M.-A. (2000). *Technology and social agency: outlining an anthropological framework for archaeology.* Oxford: Blackwell.

Dobres, M.-A., & Hoffman, C. (1994). Social agency and the dynamics of prehistoric technology. *Journal of Archaeological Method and Theory, 1*(3), 211–258.

Dyble, M., Salali, G. D., Chaudhary, N., Page, A., Smith, D., Thompson, J., Vinicius, L., Mace, R., & Migliano, A. B. (2015). Sex equality can explain the unique structure of hunter-gatherer bands. *Science, 348*(6236), 796–798.

Figuier, L. (1876). *4ème édition*. Paris: Librairie Hachette éd. L'Homme primitif, ouvrage illustré de quarante scènes de la vie de l'homme primitif dessinées par Emile Bayard et de 256 figures représentant les objets usuels des premiers âges de l'Humanité. 451p.

Fortea Pérez, J., Fritz, C., Garcia, M.-A., Sanchidrián Tortí, J. L., Sauvet, G., & Tosello, G. (2004a). L'art pariétal paléolithique à l'épreuve du style et du carbone-14. In M. Otte (Ed.), *La Spiritualité* (pp. 163–176). Liège: ERAUL 106.

Fortea Pérez, J., De La Rasilla Vives, M., & Rodríguez Otero, V. (2004b). L'art pariétal et la séquence archéologique paléolithique de la grotte de Llonín (Peñamellera Alta, Asturies, Espagne). *Préhistoire, Art et Sociétés, LIX:, 7–29*.

Foulds, F. (2010). Investigating the individual? An experimental approach through lithic refitting. *Lithics: The Journal of the Lithic Studies Society, 31*, 6–19.

Fritz, C. (1999a). *La gravure dans l'art mobilier magdalénien. du geste à la représentation.* Documents d'Archéologie Française (D.A.F.), 75, Edition de la Maison des Sciences de l'Homme, Paris.

Fritz, C. (1999b). Towards a rebuilding of the Magdalenian artistic processes: the use of microscopic analysis in the field of miniature art. *Cambridge Archaeological Journal, 9–2*, 189–208.

Fritz, C., & Tosello, G. (2004). Marsoulas: une grotte ornée dans son contexte culturel. In *L'art du Paléolithique supérieur. Actes du Colloque UISPP,* Liège, Sept. 2001. *ERAUL, 107*, 55–67.

Fritz, C., Tosello, G. (2005). Entre Périgord et Cantabres : les Magdaléniens de Marsoulas. In Jaubert, J. and Barbaza,M. (eds), *Territoires, Déplacements, Mobilité, Echanges Durant la Préhistoire, Terres et Hommes du Sud.* Actes du 126e Congrès des Sociétés Historiques et Scientifiques, Toulouse, 2001, pp. 311–327

Fritz, C., Tosello, G., & Sauvet, G. (2007). Groupes ethniques, territoires, échanges: la notion de "frontière" dans l'art magdalénien. In N. Cazals, J. González Urquijo, & X. Terradas (Eds.), *Frontières naturelles et frontières culturelles dans les Pyrénées préhistoriques* (pp. 165–181). Santander: Publican-Ediciones de la Universidad de Cantabria.

Gamble, C. (1999). *Paleolithic Societies of Europe*. Cambridge. UK: Cambridge University Press.

Gamble, C. (2007). *Origins and revolutions. Human identity in earliest prehistory*. Cambridge, UK: Cambridge University Press.

Gamble, C. (2013). *Settling the Earth. The archaeology of deep human history*. Cambridge, UK: Cambridge University Press.

Gamble, C., & Gittens, E. (2004). Social archaeology and origins research: a Paleolithic perspective. In L. Meskell and R. Preucel (Ed.), *A Companion to Social Archaeology* (pp. 96-118). Malden, MA and Oxford, UK: Blackwell.

Gell, A. (1998). *Art and Agency*. An Anthropological Theory: Oxford University Press, Oxford, UK.

Gero, J. (1991). Genderlithics: women's role in stone tool production. In J. Gero and M. Conkey (Ed.), *Engendering Archaeology. Women and Prehistory* (pp.163-193). Oxford: Blackwell.

Guthrie, D. (1984) Ethological observations from Paleolithic art. In Bandi, H.G.,Huber, W., Sauter, M-R., and Sitter,B. (eds), *Contribution de la Zoologie et d'Ethologie á l'Interpretation de l'Art des Peuples Chasseurs Préhistoriques.* Editions Universitaires Fribourg Suisse,Saint-Paul Fribourg, pp. 35–74.

Guthrie, D. (2005). *The Nature of Paleolithic Art*. Chicago: University of Chicago Press.

Ipiens, A., Salgues, Th. avec la coll. de Chalard, P., Du Fayet de la Tour, A., Geneviève, V., Jarry, M., Sablayrolles, Ph. (2001). Faycelles, abri de Lagrave (Lot). *Bilan scientifique 2000, DRAC Midi-Pyrénées*, Service Régional de l'Archéologie, pp. 106–108

Heinz, H. J. (1978). *Namkwa; life among the Bushmen*. London: Cape Publishers.

Jarvenpa, R., & Brumbach, H. (Eds.). (2006). *Circumpolar lives and livelihood: a comparative ethnoarchaeology of gender and subsistence*. Lincoln, NE and London: University of Nebraska Press.

Jarvenpa, R., & Brumbach, H. (2009). Fun with Dick and Jane. Ethnoarchaeology, circumpolar toolkits and gender "inequality". *Ethnoarchaeology, 1*, 59–78.

Jodry, M. (1998). The possible design of Folsom ultrathin bifaces as fillet knives for jerky production. *Current Research in the Pleistocene, 15*, 75–77.

Kuhn, S. L., & Stiner, M. C. (2006). What's a mother to do? The division of labor among Neanderthals and modern humans in Eurasia. *Current Anthropology, 47*(6), 953.

Lamotte, C. (2006) Les empreintes de mains se donnent un genre. Journal du CNRS, n°192 http://www2.cnrs.fr/presse/journal/2569.htm

Lave, J., & Wenger, E. (1991). *Situated Learning*. Cambridge, UK: Legitimate Peripheral Participation. Cambridge University Press.

Manning, J. T. (2002). *Digit Ratio*. New Brunswick, NJ: Rutgers University Press.

Manning, J. T., Scutt, D., Wilson, J., & Lewis-Jones, D. I. (1998). The ratio of 2nd to 4th digit length: a predictor of sperm numbers and concentrations of testosterone, luteinizing hormone and oestrogen. *Human Reproduction, 13*, 3000–3004.

Moro Abadía, O., & González-Morales, M. (2008). Paleolithic art studies at the beginning of the twenty-first century: a loss of innocence. *Journal of Anthropological Research, 64*, 529–552.

Owen, L. (2005). *Distorting the Past. Gender and the Division of Labor in the European Upper Paleolithic*. Tübingen: Kerns Verlag.

Péquart M., St-J. (1960–63). Grotte du Mas d'Azil (Ariège). Une nouvelle galerie magdalénienne. *Annales de Paléontologie*, XLVI-XLIX, Editions Masson, Paris.

Pigeot, N. (1987). *Magdaléniens d'Etiolles, Economie de débitage et organisation sociale. (Unité d'habitation U5)*. XXVe Supplément à *Gallia Préhistoire*, Editions du C.N.R.S., Paris.

Redman, C. L. (1977). The "analytical individual" and prehistoric style variability. In J. N. Hill (Ed.), *The Individual in Prehistoric Studies of Variability in Style in Prehistoric Technology* (pp. 41–53). New York: Academic Press.

Russell, P. (1991). Men only? The myths about European Paleolithic artists. In N. Willows and Walde, D. (Eds), *The Archaeology of Gender* (pp. 346-351). Calgary: Chacmool Archaeological Association of the University of Calgary.

Sauvet, G., Fortea Pérez, J., Fritz, C., & Tosello, G. (2008). Crónica de los intercambios entre los grupos humanos paleolíticos. La contribución del arte para el periodo 20000–12000 años BP. *Zephyrus, LXI, enero-junio*, 33–59.

Seris, J. P. (1994). *La Technique*. Paris: Presses Universitaires de France.

Sharpe, K., & Van Gelder, L. (2004). Children and Paleolithic "art": indications from Rouffignac cave, France. *International Newsletter on Rock Art, 38*, 9–17.

Sharpe, K., & Van Gelder, L. (2006a). The study of finger flutings. *Cambridge Archaeological Journal, 16*(3), 281–295.

Sharpe, K., & Van Gelder, L. (2006b). Evidence for cave marking by Paleolithic children. *Antiquity, 80*(310), 937–947.

Sharpe, K., & Van Gelder, L. (2006c). Finger fluting in chamber A1 of Rouffignac cave, France. *Rock Art Research, 23*(2), 179–198.

Shennan, S. (Ed.). (1989). *Archaeological Approaches to Cultural Identity*. London: Unwin Hyman.

Sieveking, A. (2003). Groupes locaux et contacts à grande distance dans l'art paléolithique. *Préhistoire, Arts et Sociétés, LVIII:, 85–97*.

Simonnet, R. (1996). Approvisionnement en silex au Paléolithique supérieur ; déplacements et caractéristiques physionomiques des paysages : L'exemple des Pyrénées centrales. In H. Delporte & J. Clottes (Eds.), *Pyrénées Préhistoriques, Arts et Sociétés* (pp. 117–128). Paris: Actes du 118e Congrès National des Sociétés Historiques et Scientifiques, C.T.H.S.

Slocum, S. (1975). Woman the gatherer: male bias in anthropology. In R. Rapp (Ed.), *Toward an Anthropology of Women* (pp. 36–50). New York: Monthly Review Press.

Snow, D. (2006). Sexual dimorphism in Upper Paleolithic hand stencils. *Antiquity, 80*, 390–404.

Snow, D. (2013). Sexual dimorphism in European Upper Paleolithic cave art. *American Antiquity, 78*(4), 746–761.

Soffer, O., Adovasio, J. M., & Hyland, D. (2000). The "Venus' figurines: textiles, basketry, and gender in the Upper Paleolithic. *Current Anthropology, 41*(4), 511–537.

Taborin, Y. (1992). Les espaces d'acheminement de certains coquillages magdaléniens. In Rigaud, J.Ph., Laville, H., et Vandermeersch, B. (dir*.), Le Peuplement Magdalénien, Paléogéographie Physique et Humaine.* Actes du Colloque de Chancelade, 10–15 octobre 1988, Éditions du CTHS, Paris, pp. 417–429

Testart, A. (1986). *Essai sur les fondements de la division sexuelle du travail chez les chasseurs-cueilleurs*. Paris: Ecole des Hautes Etudes en Sciences Sociales.

Tosello, G. (2003). *Pierres Gravées du Périgord Magdalénien : Art, Symboles, Territoires, XXXVIe supplément à Gallia Préhistoire*. Paris: CNRS éditions.

Tosello, G. (2011). *Le temps d'un rêve*. Paris: Editions Errance.

Tosello, G., Fritz, C. (2005). Les dessins noirs de la grotte Chauvet : essai sur leur originalité dans le site et leur place dans l'art aurignacien. In Geneste, J-M. (dir.), Journées de la Société Préhistorique Française 11–12 octobre 2003. Université de Lyon 1, *Bulletin de la Société Préhistorique Française,* Travaux 6 et *Association Française de Karstologie, Mémoires* 11, pp. 159–173

Vallois, H. V. (1928). *Etude des empreintes de pieds humains du Tuc d'Audoubert de Cabrerets et de Ganties* (pp. 328–335). Amsterdam: Congrès International d'Anthropologie et d'Archéologie Préhistorique, III.

Van Gelder, L., & Sharpe, K. (2009). Women and girls as Upper Paleolithic cave 'artists': deciphering the sexes of finger-fluters in Rouffignac cave. *Oxford Journal of Archaeology, 28*(4), 323–333.

Vanhaeren, M., & D'Errico, F. (2003). Le mobilier funéraire de la Dame de Saint-Germain-La-Rivière et l'origine des inégalités. *Paléo, 15*, 195–238.

Weedman, K. (2002). On the spur of the moment: effects of age and experience on hafted stone scraper morphology. *American Antiquity, 67*(4), 731–744.

Weedman Arthur, K. (2010). Feminine knowledge and skill reconsidered: women and flaked stone tools. *American Anthropologist, 112*(2), 228–243.

Whallon, R. (2006). Social networks and information: non-"utilitarian" mobility among hunter-gatherers. *Journal of Anthropological Archaeology, 25*(2), 259–270.

Whallon, R., Lovis, W. A., & Hitchcock, R. K. (2011). *Information and its Role in Hunter-Gatherer Bands. Cotsen Institute of Archaeology Press, Ideas, Debates and Perspectives 5*. Los Angeles, CA: University of California Los Angeles.

White, R. (2003). *Prehistoric Art*. New York: The Symbolic Journey of Humankind. H.Abrams.

Wobst, H. M. (1976). Locational relationships in Paleolithic society. *Journal of Human Evolution, 5*, 49–58.

Wobst, H. M. (1978). The archaeo-ethnology of hunter-gatherers or the tyranny of the ethnographic record in archaeology. *American Antiquity, 43*(2), 303–309.