Palaeolithic Art: More than Meets the Eye? An Object Biography Approach to Engraved Stone Plaquettes from the Magdalenian Site of Montastruc, South-Central France.

3 Volumes. Volume 1

Andrew Paul Needham

PhD

University of York

Archaeology

April 2017

Abstract

This thesis asks a simple question of Palaeolithic art: is there more to it than meets the eye? In exploring the history of the study of Palaeolithic art, a strong bias is revealed, a fixation on how the art looks in its finished form. An object biography approach, augmented by a suite of new digital techniques, and by non-western insights into ontology concerning humans, and animals and objects, is used to explore Palaeolithic art from a different perspective. This approach is explored through its application in a detailed case study: the analysis of engraved stone plaquettes from the Magdalenian site of Montastruc, southern France. The plaquettes are assessed not only based on their visual attributes, but how they were made, used and deposited, enhanced via the use of 3D models and microscopy. Emphasis is placed on trying to re-contextualise the collection, offering an analysis of all objects from the Peccadeau de l'Isle collection held in the British Museum, *c.* 15,620 objects. These broad life phases are considered within a Magdalenian cosmology occupied by numerous agents, beyond the bounds of humans alone. In the creation and use of art, this non-human agency is argued to be evident, playing an active role in the choices made by the artists working at Montastruc. The plaquettes are argued to be deeply social, made close to fire and by multiple artists of varying skill. The plaquettes had a distinct life history when compared to organic art objects found at the site, highlighting the nuance that can be revealed through an object biography perspective. The rich interpretations made possible by shifting the archaeological gaze to object biography, insights from non-western anthropology, and new high-resolution digital techniques are argued to represent a significant approach that can potentially be applied to other Palaeolithic art contexts and beyond.

List of Contents

Volume 1.

Volume 2.

Volume 3.

List of Tables

List of Figures

List of Accompanying Material

The PhD is accompanied by a USB hard drive containing appendix 6, photographs of a random sample of stone tools from Montastruc; appendix 7, high-resolution 3D models of plaquettes from Montastruc; appendix 11, photographs of additional organic objects from Montastruc; and appendix 13, 3D model stills of plaquettes from Montastruc.

Acknowledgements

This thesis would not have been possible without the help and support of so many people from the very creation of the project through to its completion. A complete list would risk turning into a thesis in its own right. I offer thanks to all of those people who have helped and briefly note some contributions below.

The project has meandered and changed considerably across its life, a complexity becoming of a project that explores the life history of things! Dr. Penny Spikins, Dr. Sonia O'Connor, Professor Terry O'Connor and Professor Mathew Collins were generous with their time and insight in formulating the initial thesis prior to my application for a place and funding, especially in turning my wild theoretical musings into something grounded and testable. Dr. Ben Elliott also helped me greatly in a critical reading of an early draft of my funding application. While the project is quite distinct from that initial sketch, I would never have made it to this point without that initial help.

Throughout my PhD, I have been fortunate to be able to discuss ideas and chapters with my thesis advisory panel, Dr. Penny Spikins, Professor Mark Edmonds, and Dr. Oliver Craig, to whom I extend my thanks. My work has benefited from their interest, critical input, and support, for which I am grateful.

During my PhD I had the privilege to work with the Palaeolithic art collections based at Franks House, The British Museum, on a protracted basis across 2014-2015. I extend my thanks to The British Museum and all of the museum staff working in the Prehistory and Europe department. This was a real highlight of my research and it was made all the better by being able to work alongside such a great team of people. In particular, I thank Jill Cook for her assistance in training, her constant support and supervision throughout my time in London, and for many a lively chat about all things archaeological in The Bridge Café before work. This research would not have been possible without her support, expertise, generous giving of time and infectious enthusiasm for material culture, which encouraged me to explore plaquettes from Montastruc. I am eternally grateful. While studying in The British Museum, I had the great fortune to work alongside some amazing people, whose dedication, expertise and passion were a source of inspiration. My work was made all the more enjoyable for your interest, enthusiasm, and support, and I am deeply grateful. I extend my thanks to: Marianne Eve, Nicola Crompton, Jane Desborough, Sam Wyles, Debbie Buck, Elena Jones, Lucy Ellis, Haneesha Melwani, Emma Lunn, Caroline Lyons, James Baker, Jamie Mudle, Dr. Claire Lucas, Dr. Beccy Scott, Dr. Claire Harris, Dr. Nick Ashton, and Dr. Rob Davis. Without your help this project would not have been possible. Thanks to each of you for making working in the museum so enjoyable!

Thanks to Dr. Rob Davis and the University of Bradford for access to and training with a high resolution MechScan whitelight scanner, BioArch, University of York for the use of a Dino-Eye recording device, and The British Museum for use of a microscope. Thanks to Dr. Laura Fitton and the Hull York Medical School for help with final manipulation and conversion of 3D models and 3D printing. My thanks to Charlie Rowley and Josie Mills for their help and stimulating discussions with all things pXRF.

My work has benefited by the inclusion of French archaeological literature. Dr. Claire Lucas and Professor Paul Bahn were both of great help in suggesting references and research directions in this respect.

My thinking has benefited from engaging discussion at a number of conferences at which I have presented: Unravelling Human Origins, Cambridge 2012; Chauvet Cave workshop, York 2014; Theoretical Archaeology Group, Manchester 2014; Unravelling Human Origins, Oxford 2015, Theoretical Archaeology Group, Bradford 2015; department of archaeology postgraduate research forum, York 2015; Theoretical Archaeology Group, Southampton 2016; Unravelling the Palaeolithic, Liverpool 2017. I extend my thanks to the organisers of each session in which I have presented.

Chapters of the PhD have benefited from the reading of earlier drafts. I am deeply grateful to all who suffered through readings of earlier drafts of the manuscript for their time, thoughtful and challenging comments and much needed critique. Dr. Nick Overton and Charlie Rowley read an earlier draft of chapter 3, and Rachel Shield read an earlier draf of chapter 2. My deepest thanks are reserved for Dr. Penny Spikins. Her tireless support in reading earlier drafts of the full thesis has undoubtedly improved the work presented here.

I was fortunate enough to receive several grants to facilitate parts of my research, for which I am grateful. I extend my thanks to the Arts and Humanities Research Council for PhD block grant, which funded my research for 3 years. My work would not have been possible without this help. I again thank the Arts and Humanities Research Council for two travel grants to support my research at The British Museum, London. I thank the University of York for support in attending conferences via Departmental Research Funding. The project would not have been possible without this financial support.

I would like to thank my family for their support throughout my PhD, my mother Christine Needham, my father Paul Needham, my sister Sarah Taylor and my brother-in-law Gareth Taylor, and their amazing son and daughter, George and Florence, as well as my extended family for their interest, enthusiasm and support. I am grateful to a great group of friends and colleagues for their support, advice and help: Dennis Rowland, Dr. Nick Overton, Dr. Barry Taylor, Dr. Amy Gray Jones, Becky Knight, Charlie Rowley, Shannon Croft, Dr. Sophy Charlton, Dr. Harry 'Chief!' Robson, Dr. Ed Blinkhorn, Dr. Ben Elliott, Dr. Chantal Conneller, Professor Nicky Milner, Hannah Simons, Gail Hitchens, Don Henson, Dr. Katherine Cook, Liz Matthews, Derek Hodgson, Dr. Penny Spikins, Dr. Rob Dinnis, Dr. Matt Pope, Dr. Beccy Scott, and Jill Cook. My deepest thanks are reserved for my partner, Rachel Shield. This would not have been possible without your constant support.

Author’s Declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

Chapter 1. Introduction

Chapter 1. Introduction

1.1. Palaeolithic Art: More Than Meets the Eye

There is a central, dual assumption in Palaeolithic art research. It is typically construed as an inherently visual material culture and it's meaning is sought through research efforts that fixate on the finished form. While there is truth to both of these statements, this assumptive orthodoxy comes at a cost, predictably producing an archaeology of prehistoric art relatively impoverished in all respects beyond the visual and the finished form. This PhD adopts a different starting point in approaching art, continuing a line of thinking expressed in embryonic state elsewhere (Needham 2010), that Palaeolithic art is about *more than meets the eye*. The central thesis of this research is that a shift in the approach to art, exploring object biographies and adopting a relational approach inspired by non-western hunter-gatherer ways of seeing the world, can provide new insights into art objects that might otherwise be missed by focussing on the visual and finished form alone. This is an exercise in *decentring* (Finlay 2014) rather than discarding; the visual is important but not always centrally so. This is best revealed in tracing the life history of art pieces through a deep reading of their context in an approach that adopts a balanced use of both theory and technical method to interrogate specific, object-led, emergent research questions specific to each stage of a specific object's life history and to the broader, integrated 'meaning' of an assemblage of objects.

1.2. Challenges to an Object Biography Approach to Palaeolithic Art: Context and Technique

The rebuilding of context, an essential component of a contextual, object biography approach, is perhaps nowhere more challenging than when applied to the Palaeolithic. Many of the most substantial bodies of Palaeolithic art were unearthed in the 19^{th} century during a rush to discover early prehistoric archaeology that could definitively demonstrate the antiquity of humanity (see chapter 2). As a result of this *historical context*, they are typically subject to the limitations of poor excavation quality typical of excavations carried out in the 19^{th} century, leading to limited contextual understanding of those objects recovered. This is compounded by collections frequently being split across museums and private collections, reflecting different phases of working by different excavators, limiting the capacity to analyse whole assemblages. Objects of such rarity and age as Palaeolithic art are necessarily carefully managed and conserved to ensure their continuing stable condition within a museum setting. The limitations to access, handling and transport imposed by these restrictions, what is here termed the *research context,* make for a unique challenge to research efforts. In practice this can limit the potential for objects to be displayed and for some techniques to be used, whether because of the risk posed to the object or the risk attached in moving the object to the technology required, which itself cannot be moved. Techniques that can contribute to the analysis of art objects whilst also respecting the limitations imposed by the research context encountered are an essential component of the approach. In exploring object biographies, which are necessarily reliant on a good understanding of the archaeological, historical and research context, the need to rebuild a sense of this context is pressing.

1.3. Application of the Approach: Engraved Plaquettes from Montastruc

The assemblage of engraved stone plaquettes from Montastruc act as an excellent case in which to explore this approach. Montastruc was selected as a collection exactly because it is *not* easy to study due to its limited associated context. In this, Montastruc is typical of art collections more broadly. An approach that is effective despite poor context has greater potential for application to a broader range of art bearing sites and beyond. Montastruc is a rockshelter site dating to the Mid- to Late Magdalenian, located beneath a 29m high limestone cliff exposure adjacent to the river Aveyron in the department of Tarn-et-Garonne, south-central France. The site was initially excavated by Peccadeau de l'Isle in 1864 and again in 1866-1867, and subsequently by Bernard Bétirac in the mid 20th century. The collection is now primarily split between The British Museum, UK, which acquired the Peccadeau de l'Isle collection in 1887, and Le Musée d'Histoire Naturelle Victor Brun, France, housing the Bétirac collection. Research necessarily focuses on the former component of the collection on the grounds of access. The site is notable not only for its rich corpus of mobiliary art, with 53 engraved stone plaquettes and 107 decorated organic pieces stored in the British Museum component of the collection alone, but the historical context in which these discoveries are situated, being amongst the earliest recognised Palaeolithic art, entrenching the site within the formative milieu of the Palaeolithic. The collection has received only summary publication as a totality (Sieveking 1987a) with selected objects having received a more detailed treatment, especially organic objects (Cook 2010; Cook 2013, 199, 204, 209, 218, 233, 243, 248, 266, 267-272; Farbstein 2013; Welté 1991). This compares favourably to the Bétirac collection, which remains largely unpublished and inaccessible, except for several objects stored in Musée Archéologie

Nationale, Saint-Germaine-en-Laye, France, such as a horse spear thrower (Ladier 2012; Pigeaud 1999), and a summary article by Bétirac (1952). Recent publications of aspects of the site and collection have advanced understanding in two critical ways: the use of high-resolution techniques to explore specific details of objects in greater detail (Cook 2010; 2013), and the use of theoretical frameworks to similarly further understanding through the contextualisation of such attributes, especially chaîne opératoire and production as socio-cultural gesture (Farbstein 2013a). There is a need to expand both new techniques and new theoretical perspectives to the stone plaquettes from Montastruc and reanalyse the collection in light of these approaches, expanding the study of the objects from catalogue to comprehensive analysis. The approach outlined above, of shifting to an object biography and relational approach, resonates well with a trajectory of research already begun at the site in recent analyses (Cook 2010; 2013; Farbstein 2013a) and in Paleaolithic art study more broadly (e.g. Farbstein 2011a; 2011b; 2013b; Needham 2010; Piprani 2011; Porr 2015; Porr and Bell 2012; Porr and de Maria 2015; White 1992).

1.4. Aim

The central aim of the PhD is therefore to explore the Montastruc plaquettes from an object biography perspective, informed by theory derived from non-western ethnography, including relationality, materiality and animistic ontology. This will be facilitated by research on the context of the Montastruc site, using techniques that allow for rigorous analysis and pose little risk to the objects. In so doing, the outlines of an approach that can be used in other Palaeolithic art collections, other classes of objects, and perhaps other species, will be generated.

1.4.1. Objectives

1. Critically assess Palaeolithic art, its categories and its history, and review previous approaches, highlighting limitations.
2. Explore elements of non-western worldviews to facilitate interpretation of a contextual object biography as an alternate way to approach Palaeolithic art.
3. Explore new techniques to facilitate analysis and engagement to facilitate a contextual object biography approach, sensitive to the research context encountered.
4. Create *contextual frames* for the case study site, Montastruc, to facilitate application through an assessment of the broader material culture set at Montastruc and a review of the Magdalenian.

5. Integrate these elements, alongside previous research from Montastruc, to re-analyse the plaquettes, including how they were made, used and deposited, creating a sense of their life history.

1.5. Summary of Chapters

Chapter 2 addresses objective 1 and reviews the history of Palaeolithic art. The historical context of Palaeolithic art discovery, dominant strands of thinking at the time and how this influenced recognition, categorisation and interpretation is explored. It is suggested that this is still a shaping influence on art interpretations in contemporary research. This serves to highlight the need for new approaches to art interpretation and analysis, making the case for a *decentring* of Palaeolithic art, especially with the growing appreciation of art as a multi-species phenomenon. It further serves as historical context for Montastruc in the broadest sense, offering a critical awareness of the 19th century social milieu in which art objects were found, linked to excavation strategy and artefact recognition and retention.

Chapter 3 outlines an approach that is simultaneously a response to those problems identified in chapter 2, but also tailored to the particular needs of the Montastruc collection, addressing objectives 2 and 3. A case is made for the need to shift from a default perspective of fixating on the finished object, exploring this devoid of context. It is suggested that an effective alternative is to explore Palaeolithic art through a relational and object biography approach. This approach naturally encourages a *decentering* of the art, shifting away from an exclusive interest in the visual and the finished form and towards studying every aspect of production, use, and decommissioning or deposition. This approach naturally generates specific and demarcated research questions that can be tested with rigorous, quantitative techniques, the results of which can be a significant shaping influence in a holistic, theory infused narrative of the life history of the objects in question, in this case the plaquettes from Montastruc. Critical to this approach is the building of context around the art in question, both at the level of the site, region and beyond.

Chapter 4 continues in a similar vein to chapter 2, addressing objective 4 by exploring the broader Magdalenian context for the site of Montastruc, or *contextual frame*, discussing major themes within the Magdalenian, the findings of which are used to aid in characterising the types of activity that may have taken place at Montastruc by virtue of the broader material culture record that has been recovered. The recognition of major trends in the Magdalenian is significant in rebuilding activity at Montastruc where little is known about activity based on the quality of 19th century excavation practices, a lack of supporting literature about the excavation, and only the homogenised material culture assemblage from which to build direct site context. The chapter focuses on exploring the Magdalenian through the lens of three main categories: humans, animals, and things, as well as the interactions of these entities within a Magdalenian context, using art as an example. These themes are central to the understanding of art at Montastruc and so an understanding of their interplay within the Magdalenian world is similarly significant in creating context. These themes not only allow for a summary of the Magdalenian lifeway but also act as a primer for understanding relationships within Magdalenian art, which primarily involve the interaction of these entities.

Chapter 5 continues directly from chapter 4 in the attempt to rebuild a more specific contextual frame for Montastruc, addressing objective 4. Using chapter 4 as a foundation, chapter 5 adopts a holistic approach to site reconstruction, synthesising analysis from all classes of artefacts recovered from Montastruc recorded by Peccadeau de l'Isle and held in the British Museum, some 15,620 artefacts. The vast majority of these objects have not been subject to previous publication and they together represent a significant advancement in attempts to understand and contextualise the site. Taken together, and using insights derived from chapter 4 as a point of comparison, suggestions of date, temporality, seasonality, site function and site significance are teased out from the available sample of material culture. In the same way that the Magdalenian context (chapter 4) allowed for contextualisation of Montastruc (chapter 5), the exploration of the broader collection of Montastruc (chapter 5) facilitates the contextualisation of the engraved stone plaquettes from the site (chapters 6, 7, 8).

Chapter 6, together with chapters 7 and 8, address objective 5 in detailing an object biography of the engraved plaquettes from Montastruc, with reference to the organic assemblage as a point of contrast at different stages of the life history. Chapter 6 details the selection and acquisition of limestone as a support for plaquettes. A case is made for material selection as a critical stage in art production. Blocks of limestone were used preferentially over other available materials and these were all naturally detached from the surface of the rockshelter by freeze-thaw action. The natural process of freeze-thaw is argued to have been understood to be agentic, a pattern of gifting between rockshelter and human. The rock is argued to have been active in the creation of animal forms, with evidence that features of the native shape of the material were intentionally incorporated into the animal forms depicted. The selection of material was deeply significant and 'raw' material was anything but. The case is made that materials were charged with significance.

Chapter 7 builds from chapter 6 and continues in addressing objective 5, detailing the engraving and painting of the plaquettes. A case is made for the negotiation of animal forms within the rock rather than imposition of form onto the limestone blocks. Natural and suggestive surface morphology was incorporated into the animal forms depicted. This supports the findings of chapter 6. The forms were in part present within the rock, with human action embellishing and negotiating the form. A seasonal disconnect is noted between the animals depicted and the probable season of occupation at the site, suggesting the art was not simply a direct reflection of the local environment. Rather, there would appear to be a play on time and space, whether through the anticipation of animals to be seen, or a casting back of the mind to animals encountered in the past at another time and place. A case is made for a wide variety of authors of the art, with evidence for a breadth of skill present in the plaquette engraving. This is evidenced through the presence of highly diverse engravings of the same species. However, underpinning this difference is a sameness of composition. Line ordering of depictions appears to be highly standardised and this may indicate the presence of teaching and learning practices in relation to the manufacture and use of engraved plaquettes.

Chapter 8 builds further from chapters 6 and 7 and continues to address objective 5, detailing the burning and fragmentation of the plaquettes after their engraving. A case is made for the intentional obscuring of art through their exposure to fire. A case is made that fire first acted to render engraving vibrant and living before merging them back into the rock through changes in colour, before obscuring them completely through their intentional thermal fracture. In fragmenting the limestone through thermal fracture, marine fossil inclusions were rendered visible. This is argued to be a reinforcing element within an ontology in which animals were thought to reside within the rock. The animals forms are considered and found to vary in their season of depiction compared to the season This destruction was perhaps construed as constructive, giving rise to new pieces of limestone with evocative shapes that held the potential to be used again, whether at the site or elsewhere. The lack of refitting fragments of plaquettes is suggested to evidence their intentional fragmentation. The life histories of the fragments of plaquettes might have unfolded over time and space, beyond the site of Montastruc itself.

Chapter 9 reflects on the approach and considers the potential for further application and eventual synthesis of plaquettes at the regional level. Exploring Montastruc and the approaches used in its analysis and interpretation as a model, the chapter explores how the approach can impact the study and dissemination of Palaeolithic art at the more general level. The approach adopted scales up to address how it can challenge the orthodoxy in current Palaeolithic art research. It does this by breathing new life into historic collections with limited context. A comparison is made to Sieveking's (1987b) plaquette synthesis, of which Montastruc was a part, with the results of the object biography approach presented here. The particular material modification identified at Montastruc, such as burning, integrating natural features, thermal fracture, range of skill in engraving, are common. However, this does not mean that the results of the Montastruc analysis have direct bearing on the interpretation of these other collections. That would be to disregard context, a central part of the re-analysis of Montastruc. Rather, the results can be used as testable hypotheses for the continuing application of the approach to other collections. The comparison and synthesis of the results of parallel objects biographies is suggested as one route to creating meaningful syntheses.

Chapter 10 concludes the research, summarising the results and assessing the efficacy of the approach. Avenues of future research are considered at both the small scale, linked to the Montastruc collection, and leveled at Palaeolithic art more broadly, drawn largely from weaknesses identified in the application of the approach to Montastruc, but which have broader significance for application to other collections.

Chapter 2. In Pursuit of Meaning: The Interpretation of Palaeolithic Art in Historical Context

Chapter 2. In Pursuit of Meaning: The Interpretation of Palaeolithic Art in Historical Context

2.1. Introduction

Attempts to define and categorise Palaeolithic art and interpret its meaning(s) are as old as its very discovery. For all their diversity, historical and contemporary approaches to art are framed by adherence to an inherent and rigid orthodoxy; interpretations are channeled through the same field of assumptions even as they become more elaborate and varied. This orthodox approach paints Palaeolithic art as a primarily human, western European, visual medium that communicates symbolic meaning through the finished form, rendered intelligible to contemporary scholars via a shared, universal human neurology. Correspondingly, the visual and the finished form are the primary attributes around which definitions, typologies and interpretations are, and always have been, built.

This chapter sketches the emergence of this orthodox approach to art, beginning with a summary of the discovery of the Palaeolithic and how the Victorian social milieu influenced, and indeed continues to influence, understandings and approaches to art, key amongst which was the initial rejection of art in an emerging deep time evolutionary narrative of human origins. The influence of this initial framing of the nature of art and its ramifications for Palaeolithic people will be highlighted in contemporary research via a review of recent approaches to art, all of which place central importance on the visual appearance of the finished form in the art being studied. The shamanic approach to Palaeolithic art is reviewed and critiqued in greater detail, in part because it has become an increasingly popular position, but also because it encapsulates many of the contemporary tensions in art interpretation. This is further explored through the treatment of a new wave of early hominin art objects, the treatment of which closely parallels those early art objects found in the Victorian period. As calls for art in non-human species intensifies, debates of simplicity vs. complexity mirror those made about Palaeolithic humans by Victorian scholars. The orthodox approach has encouraged the repetition of the same lines of argument regarding early hominins as it did initially for Palaeolithic humans, even in the presence of new evidence. A case is made for the need to relax this orthodoxy and to begin from a different vantage altogether. Recent relational and object biography approaches are argued to be an important development in the theoretical, and recent developments in the technical, such as dating, also facilitates exploring the art anew without so strong and circular an emphasis on the visual appearance of the finished form.

2.2. Palaeolithic Art: The Context of Discovery, A Historical Social Milieu

The struggle for meaning is a constant theme in the early origins of the Palaeolithic, and of Palaeolithic art. The origins of art in the Palaeolithic is tied to that of the period itself, as well as broader societal shifts in the mid to late 19th century, notably the emergence of evolutionary thinking and concepts of deep time, through advances in biology and geology respectively. These concepts were, in turn, the instigating principles for a profound questioning of the nature of humanity, played out primarily through the work of evolutionary and religious scholars, in which an emerging Palaeolithic archaeology, and especially Palaeolithic art, took on an increasingly important role with each passing discovery. All interpretations of Palaeolithic art, whether historical or contemporary, are to a greater or lesser extent influenced by this historical milieu in which the very concept of Palaeolithic art was forged. A wider appreciation of the origin of the Palaeolithic, and debates therein, is central to understanding how art was defined, categorised and interpreted, and where aspects of orthodoxy in the study of art came from. Much of early Palaeolithic art debate and interpretation centred not on understanding art itself but in informing wider arguments in an emerging unilinear human evolutionary narrative. A case will be made in this chapter that this trend has repeated itself with the emergence of traces of art in non-human species in the last decade, with art currently understood as symbolic, symbolic as indicative of cognitive complexity, and cognitive complexity informing on the complexity or simplicity of early hominin species, often in direct comparison to humans. This shapes attitudes to how art should be studied, what is and is not relevant to analyse, separating specific bodies of art from their context to serve this larger agenda. The following sections explore this history, its importance for Palaeolithic art and interpretations of it, and critically its influence over contemporary research.

2.2.1. Archaeology in the Age of Progress: The mid-19th to early 20th Century Victorian Social Milieu

Before exploring the history of the Palaeolithic directly, a more general primer of some of the significant developments in the 19th and very early 20th century will act to further contextualise the character of early human origin debates to which the discovery of Palaeolithic art is fused. It is important to understand this interplay between Victorian social outlook and emerging scientific discovery as this shaped the trajectory of archaeology from its inception. Palaeolithic art is not exempt; the nature of debates in the Palaeolithic in relation to Victorian society played a strong shaping influence in trajectories of discovery, definition, categorisation and interpretation of art. Discussion focuses on the UK and France.

The period around 1800-1870 has been described as the 'age of progress', with rapid developments across a number of scientific fields, contributing to a Victorian society that cast itself as at the zenith of human achievement (McNabb 2012, 1; Moro Abadía 2006). This was a period of increasing urbanisation, industrialisation and increasing transport infrastructure, reflecting a significant change to people's everyday lives (Moro Abadía 2006). This was also a period of imperialism, colonialism and growing anthropological inquisitiveness about non-western peoples under the administration of western European powers. Rapid advancement at home and a rapidly increasing documentation of the different modes of living across the empire contributed to a sense of Victorian superiority. This meeting of a wave of technical advancement and curiosity of the broader world is perhaps best captured by the Great Exhibition of the Works of Industry of All Nations, opened on the 1st May 1851 and running through to the 11th October of the same year, held in Crystal Palace in London, a bespoke building designed specifically to house the exhibits drawn from across the Empire and beyond (Cantor 2015). With some 15,000 exhibitors and over 1,000,000 exhibits, 2,500,000 unique visitors and 6,000,000 total visits, the exhibition effectively embodied a deep sense of wonder that rippled across the nation (Cantor 2015, 232-233). This sense of western achievement and Victorian civility was wedded to a conception of non-western peoples as uncivilised by contrast, creating a growing racism that began in the academic and grew into more popular sentiment across the century (Purtschert 2015, 518).

Race was a prominent fixation both in 19th century academic research and the broader social fabric. While slavery was officially abolished in 1833 in Britain and its territories, racist thinking permeated much early scholarship (McNabb 2012, 28-29). The American civil war, fought between 1861 and 1865, was fought over the right to keep slaves and is indicative that overt racism was still a force globally in the mid-nineteenth century (McNabb 2012, 29). In the Victorian world, the study of an emerging human evolution was synonymous with the study of the human races (McNabb 2012, 29). This is central to understanding attitudes to early archaeological discoveries, a growing knowledge of non-western cultures through ethnography, and the rapid expanding practice of collecting material culture for museums and private collections (Corbey and Van Damme 2015, 6-10).

Two examples serve to highlight this pervasive racial attitude across the 19th and into the 20th century, that of Saartje (Sara) Baartman at the start of the 19th century and Ota Benga at its end. Born in 1789, Baartman (fig 2.1.) was a Khoisan woman convinced to travel from South Africa to Europe in 1810 by Hendrik Cezar and Alexander Dunlop to be toured to a curious European audience, on the promise of making her fortune (Tobias 2002, 107).

Figure 2.1.

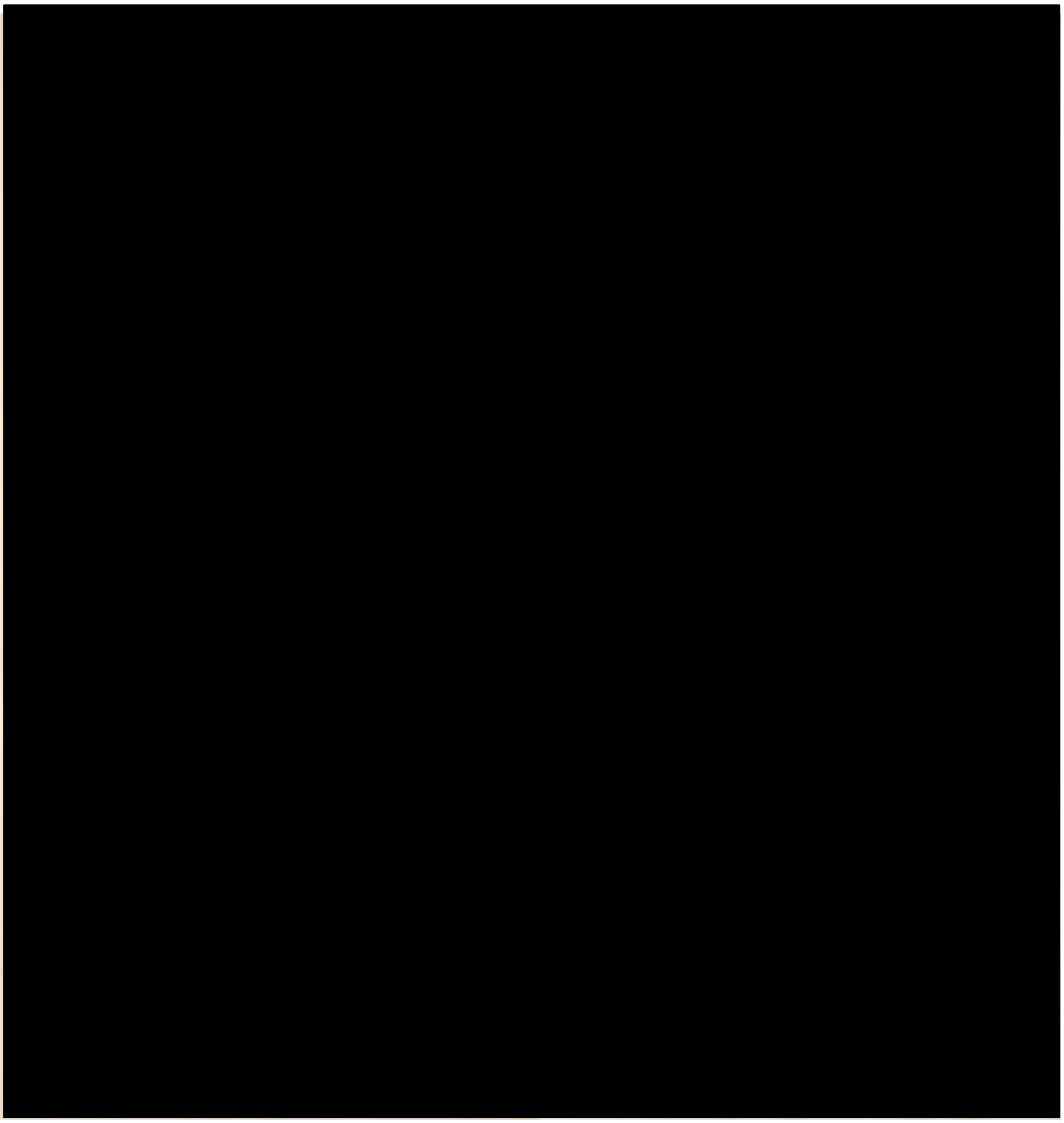

Figure 2.1. showing drawings of Saartjie Baartmn, featuring in Georges Cuvier's book concerning the natural history of mammals and described as a member of the 'bushman race', presented alongside primates in the same volume. After Cuvier 1824, 38-39.

Billed as the 'Hottentot Venus', she was presented to the public in a cage and cajoled into performing on stage at the threat of physical violence (Tobias 2002, 107). An unsuccessful trial to free Baartman likely encouraged her sale to a French animal trainer in 1814, who exhibited her in France (Tobias 2002, 107). In 1815, her suite of anatomical features, especially steatopygic fat deposits and enlarged labia minora, piqued the curiosity of early scholars, most notably Georges Cuvier, the most prominent and respected comparative anatomist of the early 19th century (Taquet 2007, 202; Tobias 2002, 107). This curiosity largely gravitated towards a package of perceived primitive anatomical traits, encouraging comparisons to monkeys and orang-utans, bringing into question her very humanity in the process (Tobias 2002, 107-108). Upon her premature death in 1816 from an unknown ailment, possibly alcohol related, Cuvier created a full body cast, conducted an autopsy, retained her skeleton, and preserved her sexual organs and brain in jars, all of which were on public display until 1955 in the Musée National d'Histoire Naturelle (Tobias 2002, 108-109). Baartman would later inspire racial interpretations of early 'Venus' figurines, so named after her (White 2006).

Saartje Baartman's dehumanising treatment is far from unique. Almost a century later, (Mbye) Ota Benga (fig 2.2.) was in 1906 exhibited at the Bronx monkey house, U.S.A., part of the human zoo phenomenon that became popular across Europe and beyond from the 1870s through to the 1930s (Purtschert 2015, 515-516). This involved the exhibiting of non-western peoples in zoos and similar settings for entertainment, 'education' and the satiation of the exotic for an increasingly curious public (Purtschert 2015, 515-516). Ota Benga was forcibly acquired by the missionary-turned-collector and outspoken racist Dr. Samuel P. Verner on the 20th March 1904 near Bassongo as part of an expedition commissioned by John McGhee to source human exhibits for the St. Louis Worlds Fair to be held in the same year (Newkirk 2015, 108). The human exhibitions drawn from around the world were designed to show the extent of the advancement of the U.S.A. (Newkirk 2015, 129). After being exhibited at the fair, Ota Benga returned to the Congo with Verner. Here he worked with the anthropologist Frederick Starr (Newkirk 2015, 15) before later returning to the USA with Verner. Upon his return, Ota Benga was temporarily stored in the basement of the American Museum of Natural History (Newkirk 2015, 171) before eventually being accepted as an exhibit in the New York Zoological Garden in 1906 by William Temple Hornaday, then in charge, with support from Henry Fairfield Osborn (Newkirk 2015, 1, 13). Hornaday justified the exhibit with direct reference to Baartman and

Figure 2.2.

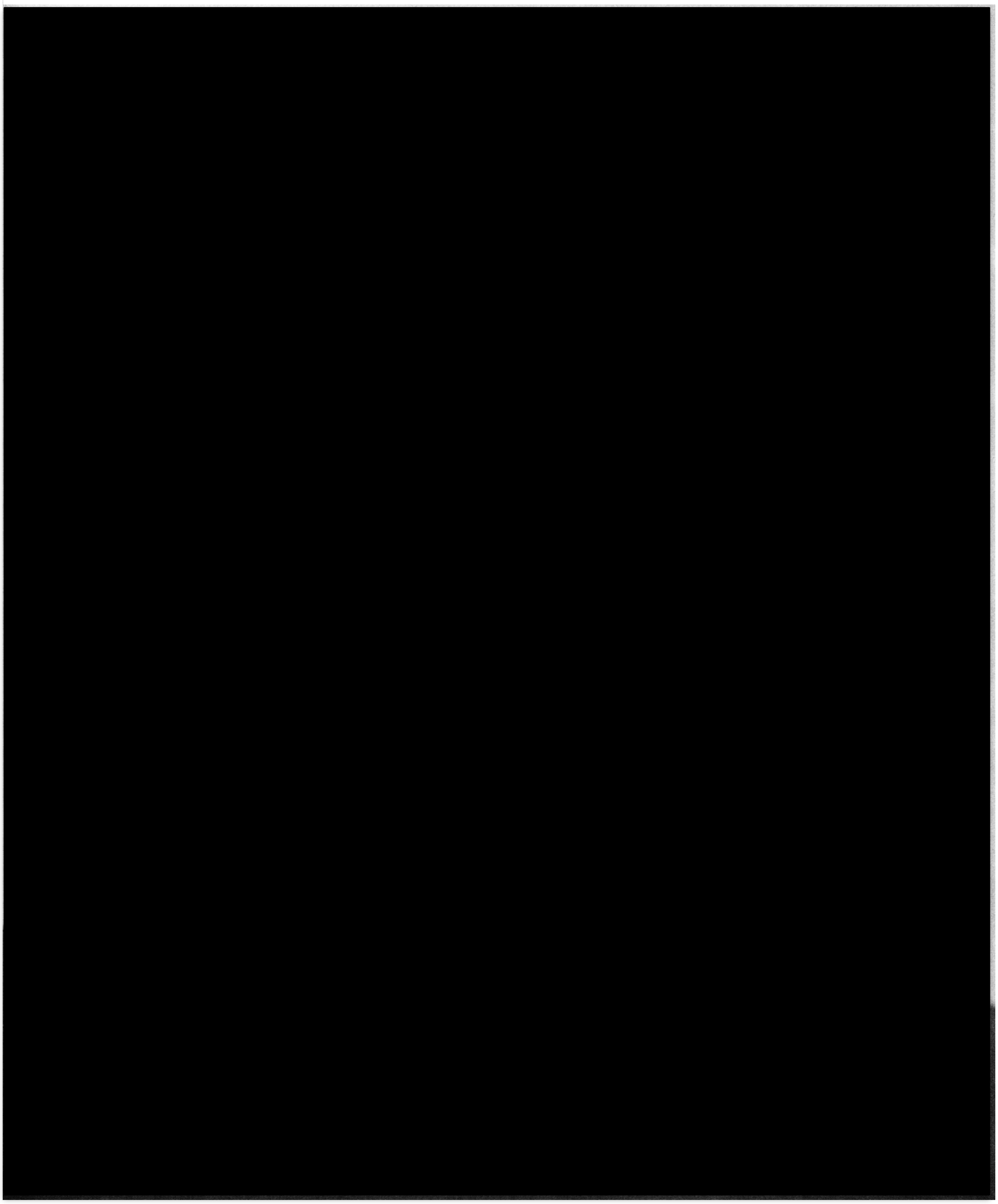

Figure 2.2. showing Ota Benga, a probable BaMbuti man, historically referred to as 'pygmy', exhibited in the Bronx zoo in New York. Image courtesy of the American Museum of National History.

other such cases that provided a clear precedent for this treatment (Newkirk 2015, 16). Ota Benga was displayed in the monkey house of the zoo between the 8th of September and the 28th of September 1906 (Newkirk 2015, 75), and was often displayed alongside an orang-utan named Dohong, which encouraged comparisons of their capacities by a hungry press (Newkirk 2015, 26). The exhibiting of Ota Benga drew record crowds, with 220,800 visitors; double that of the previous year for the same period (Newkirk 2015, 75). Ota Benga would never return home. After protests, he was released into the custody of the reverend James Gordon, where he was given basic education before moving to a farm in Long Island to continue his studies and learn a trade (Newkirk 2015, 195, 207-210). He moved to Lynchburg in 1910 and remained there until 1916, showing marked signs of depression and homesickness, eventually committing suicide (Newkirk 2015, 240).

These two sides of the Victorian world, of technological progress construed as the progress of civilisation, and the simplicity of any other race that didn't display similar levels of advancement, to the point where their very humanity was brought into question, contributed to a deeply held humanist teleological view that non-western people were suspended in different stages of primitiveness, with societal progress developing through a series of stages to which only the Victorian had ascended to the highest rung (Leeb 2015). As a result, these primitive societies could be directly compared with emerging Palaeolithic artefacts that were equally simple (McNabb 2012, 55). The study of human origins was the study of racial origins, a sameness in material culture equating to a direct sameness of culture, and by extension race, across time (McNabb 2012, 55). It also played a key shaping role in how an emerging Palaeolithic art would come to be understood and used as a lynch pin in Victorian debates of human origins on the back of a swathe of scientific discoveries that changed the shape of the Victorian world.

2.2.2. 1859: The End of the Time Before Deep Time

1859 can be identified as one of the most important years in recent history, and is perhaps *the* most important year to the Palaeolithic archaeologist (McNabb 2012, 9). Two important developments occurred which would shake the foundations of understandings of the world and are central pillars of the contemporary western worldview. Charles Darwin (1859) published his *On the Origins of Species and Descent by Natural Selection*, having first presented this work in 1858 as a joint reading with Alfred Russell Wallace (McNabb 2012, 19). Around the same time, Joseph Prestwich and John Evans, primed by their work at Brixham Cave (Windmill Hill cavern) a year earlier (O'Connor 2007, 20), and with the aid of one of the earliest archaeological photographs, confirmed the discovery of an in-situ handaxe deep within the gravels of St. Acheul, France. This supported in part the previously published 1847 findings of Jacques Boucher de Crevecouer de Perthes (Boucher de Perthes) of the association between stone tools and ancient humans (Gamble and Kruzynski 2009; McNabb 2012, 33; fig 2.3.).

It was also the decades around this date that a number of fundamental geological principles were emerging and the budding disciplines of geology and prehistoric archaeology became firmly wedded. William Buckland and Louis Agassiz, during the 1830s and 1840s, made the key suggestion, based on their geological observations in the highlands of Scotland, that ice sheets had cyclically formed on the land (O'Connor 2007, 9) This broke with an earlier orthodoxy that attributed the transport and deposition of non-local material found in terrestrial locales to the action of icebergs drifting across a flooded world, shedding material that had been entombed within as they gradually melted, a process termed *drift* (O'Connor 2007, 8). This latter interpretation had been famously espoused and popularised by Charles Lyell in his *Principles of Geology* in 1832, an influential figure in shaping the early foundations of geology (Cook 2007), creating orthodoxy and a popular alternate to earlier diluvian theories (O'Connor 2007, 8). The view that ice formed on the land was the beginning of a shift in thinking towards glaciations, a key premise to understanding complex, deep stratigraphy, in turn influencing the understanding of early Palaeolithic excavations happening around the same time. By the 1850s this new way of thinking about the geological processes that sculpted the land began to crystalise and expand, with support from Andrew Crombie Ramsay in 1851 following his own working in

Figure 2.3.

[redacted]

Figure 2.3. shows a handaxe found from St. Acheul by Boucher de Perthes and confirmed to be anthropogenic by Prestwich and Evans in 1859. Image courtesy of the British Museum.

the Scottish highlands and by Robert Chambers in 1852, both arguing for the presence of multiple glaciations (O'Connor 2007, 11-12). Archibald Geike, James Croll and James Geikie, working primarily across the 1860s and 1870s, pioneered a model of glacial and interglacial cycles, built on the astronomical foundations developed by Croll, noting changes in the earth's orbit as a possible source of glaciations (O'Connor 2007, 43-47). John Lubbock seems also to have been an early proponent of this view, featuring it in his *Prehistoric Times* (O'Connor 2007, 47), though complete acceptance would not be achieved until the end of the 19th century (O'Connor 2007, 69). In a parallel development in 1857, Hugh Falconer, working on fossilised mammals, began to appreciate the many different species of extinct pachyderm, arguing that they might provide a fine-grained means of dating stratigraphic layers (O'Connor 2007, 16), more so than the fossil molluscs that had been used from the beginning of the 19th century.

These factors combined to undermine the dominant and default position that the world was only in the order of *c.* 6000 years old, as famously estimated to 4004 BC by James Ussher in the 17th century, and was the product of a divine creator rather than natural process (McNabb 2012, 19; O'Connor 2007, 1). This position had been under attrition since the work of James Hutton in the 18th century who developed the beginnings of a theory of plate tectonics (Cook 2007) and was becoming increasingly untenable by the mid to late 19th century. It is perhaps a result of this widespread worldview, of a young world sculpted by floods sent by a divine hand, hostile to scientific fact that was demonstrating the opposite, that there were substantial delays in the reporting and acceptance of new discoveries. For example, Darwin was rushed to publication having delayed his findings for over a decade, from as early as 1844, having built his theory of evolution after his return from his voyages aboard the beagle in 1836 (Thomson 2007, 271, 274; van Wyhe 2009, 252). He was almost beaten to publication by the parallel efforts of Alfred Russell Wallace, who had arrived at the same conclusion during his collection of specimens in South America and Indonesia (Knapp 2007; McNabb 2012, 19-20). Further, discoveries of stone tools and extinct mega fauna in association with deep stratigraphy had long been known, noted during excavations by John Conyers in 1715 digging in Gray's Inn Lane, England, by John Frere in 1797 digging at Hoxne, England, and publications by Boucher de Perthes, site director at St. Acheul, France, in 1847 (Cohen 2014, Davies 2009, 136; O'Connor 2007, 1, 3, 7; fig 2.4.). In discussing their findings at St. Acheul, Prestwich and Evans made explicit reference to these earlier cases, claiming them as parallels to the French material (O'Connor 2007, 23).

Figure 2.4.

[redacted]

Figure 2.4. showing handaxes found at Gray's Inn Lane (left) and Hoxne (right). These represent some of the earliest recorded Palaeolithic artefacts recovered and recorded as anthropogenic but their significance was missed at the time of discovery. Images courtesy of the British Museum.

These delays evidence a society unprepared for findings of a magnitude that would change the character of academic debate for the remainder of the century and would go on to fundamentally shape western contemporary understandings of the world. The intellectual context for a change of this magnitude was not in place until perhaps the mid-19th century when many strands of evidence were discovered together, across disciplines, which could be woven into a difficult-to-dislodge narrative about an old humanity in a yet older world. With a growing acceptance of a world much older than previously thought and a mechanism to explain humanity's rise from 'savagery' in evolution, significant shifts occurred in later 19th century thinking. A growing awareness of the evolutionary theory of human origins, as well as tools associated with early humans, created a pressing demand for further evidence and research from all quarters, beginning a race for archaeological evidence (Davies 2009, 129; McNabb 2012, 17, 45). This milieu – a striving to answer the question of the nature of humanity and its place in the world - was a lens through which archaeological discoveries of the time were understood. This is also the time when the earliest discoveries of Palaeolithic art were made and interpreted, inexorably wedded to questions of the nature of humanity and its rise from savagery.

2.2.3. The Race for Evidence: Emerging Periods and Typologies

These findings ushered in a new age, defined by diverging schools of thought about the very nature of the world and humanity's place in it. 'Evolutionists' supported evolution and the simplicity of Palaeolithic humans, while 'fixists' supported the religious tradition of a complex humanity made by God (Palacio-Pérez 2013). An emerging Palaeolithic archaeology became the battle ground for a fundamental struggle, the conclusion of which would define understandings of the world thereafter. The need on both sides of the debate to find corroborating archaeological evidence for early human simplicity, the 'evolutionists', or complexity, the 'fixists', to support their respective positions fuelled early archaeological inquiry in the mid to late 19th century. Those supporting an evolutionary perspective and deep time, the 'evolutionists', followed a unilinear evolutionary view, conceiving the deep past to be occupied by simple savages. This view was fuelled by the increasing awareness of the diverse cultures beyond Europe, some of which had been the subject of anthropological study (Palacio-Pérez 2013). 'Evolutionists' sought to put social, cultural and cognitive distance between ancient and modern humans to demonstrate unilinear gradualism across deep time, a slowly emerging complexity with modern people at its summit (Palacio-Pérez 2013, 685-686). In such a framework, simplicity should precede complexity. Early humans had to be demonstrably savage and base to fit with notions of a transitional stage between contemporary populations and earlier extinct forms (Palacio-Pérez 2013, 685-686). The scholarly opposition to these developments, espousing a more traditional and religiously oriented view, the 'fixists', saw the hand of god in humanity. This proximity to God's image should manifest as social, cultural and cognitive complexity from inception, regardless of how far distant that inception might be. To the 'fixists', humans were made complex and, by extension, always had been complex, even if the world was considerably older than previously thought (Palacio-Pérez 2013). There emerged a central need to find simplicity or complexity in the archaeological record, with each side anticipating that an emerging prehistoric archaeology would hold the key evidence to outflank the opposing school. Upon its discovery, art would prove pivotal in this simplicity/complexity debate.

With entrenched positions on either side of the evolutionary debate, there was a growing demand for archaeological evidence. Excavation began in earnest in Europe from the 1860s, fuelled in part by this rift and the desire for unambiguous supporting evidence. Many of the most significant collections have their excavation origins in the mid to late decades of the 19th century, including Montastruc, explored in chapters 5-9 as an extended case study. Excavations were conducted at pace, often clearing entire localities in the search for artefacts in unambiguous association with early humans. The methodology across these excavations was generally impoverished by contemporary standards. This was linked to the pertinent research questions of the day. The finding of 'primitive' objects or extinct animal bones in association with humans in deep, undisturbed stratigraphy was a more central concern in light of the scholarly context than the fine gradations in stratigraphy that a more careful excavation might reveal (McNabb 2012, 89).

Significant syntheses were published in this decade, reflecting an expanding knowledge linked to this increase in excavation, and with increasing bodies of evidence there came the desire to categorise and understand. Lubbock's *Prehistoric Times* (1865), working largely from French material, gave the Palaeolithic its name, linking bodies of artefacts to particular periods, as well as utilising ethnographic parallels for the purposes of interpretation (McNabb 2012, 82). Early typological systems were developed in France and Denmark. The former, working with Palaeolithic deposits, saw the creation of periods linked to geology and dominant fauna by Edouard Lartet, subsequently expanded by Gabriel de Mortillet to incorporate anthropogenic material through type-fossils and type-sites (Schlanger 2014, 30; table 2.a.).

Table 2.a.

Age (Lartet, Mortillet)	Type site (Lartet, Mortillet)	Culture attribution (Mortillet)	Period (Pettitt)	Abbreviation	Date Range
Mammoth/wooly rhino age / cave bear age	Le Moustier (Mousterian)	Micoquian, Bohunician, Szeletian (transitional industries)	Initial Upper Plaeolithic	IUP	50-35,000 BP
Aurignacian	Aurignacian	Proto-Aurignacian, Aurignacian	Early Upper Palaeolithic	EUP	35/32-29,000 BP
Reindeer age	Solutrean, Magdalenian	Gravettian, Pavlovian, early Solutrean	Middle Upper Palaeolithic	MUP	28-20,000 BP

Reindeer age	Soultrean, Magdalenian	Solutrean, Epi-Gravettian, Magdalenian, Mezinian, Badegulian	Late Upper Palaeolithic	LUP	20-13,000 BP
Auroch/bison age	Magdalenian	Late Magdalenian, Azilian	Terminal Upper Palaeolithic	TUP	13-11,000 BP

Table 2.a. showing the varied ways of describing sub-phases of the Palaeolithic, with historical conceptions to the left and contemporary terms to the right. Information derived from Pettitt 2013 and Trigger 2007, 148-152.

These early typological systems were built around a unilinear framework, with each phase thought to be more complex than the last. This material culture typology overlapped with an emerging evolutionary anthropological position that modeled human development in the same way (Schlanger 2014, 30; Trigger 2007, Davies 2009, 130, 132; McNabb 2012, 11). For example, Christian Jürgensen Thomsen, working from the Mesolithic Kitchen midden material of Denmark and the collection of the national museum of Denmark, of which he was curator, formalised the unilinear division of Stone, Bronze and Iron Ages for later prehistory, perhaps drawing some inspiration from the bible (Rowley-Conwy 2014, 21-22). Implicit within these early systems of categorisation was the sense of a shift from simple to complex, primitive to civilised, reflecting a unilinear teleological perspective and gradualist evolutionary legacy in scholars at this time (Leeb 2015).

2.2.4. The Pivotal Role of Palaeolithic Art: The Progress Paradox

These findings foreshadowed the discovery of Palaeolithic art itself and colour much of how it was used and understood over the next century. Edouard Lartet and Henry Christy's *Reliquiae Aquitanicae*, published in 1864, published in full in 1875, is a record of excavations in the Vézère valley, France, and the first published recognition of Palaeolithic portable art (McNabb 2012, 127; Moro Abadía 2006; Moro Abadía and González Morales 2004). These excavations also proved significant in generating further support for the antiquity of humanity in the form of an engraving of a mammoth found on a piece of mammoth ivory from La Madeleine (Davies 2009, 130; fig 2.5.). This object remains one of the most important Palaeolithic finds, demonstrating unambiguously the association between humans and extinct cold-adapted megafauna (Davies 2009, 130). This was also confirmed with finds from Montastruc, with a 'poignard' (spear thrower) made from reindeer antler, depicting a mammoth, similarly evidencing human awareness of this extinct species (Lartet and Christy 1875, 207; fig 2.6.). The antediluvian models of Georges

Cuvier and William Buckland, espoused early in the 19th century, had considered the potential for extinct fauna to pre-date the biblical flood, but hadn't considered this possible for humans (O'Connor 2007, 4). This find eroded any possible doubt surrounding the co-occurrence of extinct mega-fauna and ancient humans, confirming their shared antiquity.

Figure 2.5.

[redacted]

Figure 2.5. showing a depiction of a mammoth engraved onto a piece of mammoth ivory from La Madeleine. This became a key piece of evidence in demonstrating the association between humans and extinct animals, in turn supporting an ancient origin for humanity. Image after Paillet 2011, 260, 262.

From its discovery, portable art was considered to be mere decoration, an embellishment to otherwise functional objects, with little ramification for

Figure 2.6.

[redacted]

Figure 2.6. showing a fragment of spear thrower, from the Magdalenian site of Montastruc, depicting a mammoth and made from reindeer antler. This object similarly supported a connection between archaic humans and extinct species. Image courtesy of the British Museum.

the simplicity/complexity debate, and was readily accepted upon publication (e.g. Christy 1865, 368). A good example of this early acceptance is the reconstruction drawing presented by Figuier in his *Primitive Man*, published in 1870 (fig 2.7.). Produced before the discovery of parietal art, it depicts a number of adult men working on the "arts of drawing and sculpture'' (Figuier 1870, 108 [fig 68]), feats less indicative of cognitive complexity but rather technical skill. This attitude is evidenced by the title of the book from which the image is drawn (Figuier 1870). By contrast, the discovery of parietal art at Altamira by Don Marcelino sanz de Sautuola in 1879, and its publication in 1880, posed a significant problem to early unilinear evolutionary scholars (Bahn 1992, 339-340; Fagan 2014, 34), sometimes referred to as the *progress paradox* (Moro Abadía 2006, 124). Early humans were thought too simple, indeed *had* to be too primitive, to produce art that paralleled Victorian society's own artistic efforts in the fine arts to support a unilinear evolutionary narrative; complex art posed a challenge to claims of an initial primitive state for humanity (Conkey 2010, 273).

Figure 2.7.

Figure 2.7. showing an early reconstruction of art production in the Palaeolithic. The image was produced before parietal art was discovered and art was thought to reflect a skilled craft rather than 'art proper'. Image after Figuier 1870, pp. 108 [fig 68].

The progress paradox hinged on Palaeolithic art specifically in large part due to the role of art in Victorian society. Victorian conceptions of art were based on Enlightenment notions of naturalism, as separate from mundane spheres of life, as entirely for its own sake, and ultimately reflective of aesthetic impulses (Palacio-Pérez 2013, 694). Art was still heavily influenced by the 18th century Enlightenment framework of dividing art into 'fine art' and ‘craft’. The former was associated with the artist and the cerebral, works of pure imagination, while the latter was associated with the artisan or craftsman, reflecting works of replication, technical skill, and as embellishment to otherwise functional and practical objects (Moro Abadía 2006, 126; Palacio-Pérez 2013, 694). This division was enshrined in the arts and crafts movement, which emerged around this time (Moro Abadía 2006). Art became embedded within notions of complexity, which in turn became incompatible with early Palaeolithic humans who, according to evolutionary theory, *had* to be simple to conform to a unilinear and gradualist evolution. This Victorian conception of art informed its early study in archaeology, especially between 1860 and 1925, leading to an almost synonymous relationship between fine art and parietal art and craft and portable art (Moro Abadía 2006, 134, fig 2.8.). Fine art in the Palaeolithic was not only incompatible with an evolutionary perspective, but also with a Victorian worldview which portrayed itself as uniquely civilised, refined, elevated above nature; the end product of evolution (Moro Abadía 2006).

Figure 2.8.

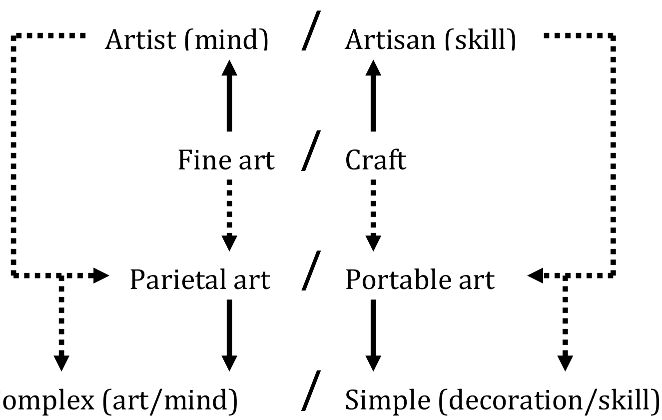

Figure 2.8. showing the link between concepts of fine art and craft and how they have led to the formation of the Palaeolithic art categories of parietal and portable art. Image: author.

The circumstances of the initial rejection of art from Altamira are revealing of broader intellectual debates beyond art that it was being used to inform. Gabriel de Mortillet, a radical anti-clericist, used his influence to shape opinion into viewing Altamira as a ‘Jesuit plot’ designed to undermine the efforts of evolutionary scholars (Bahn 1992, 340). This may have been fuelled by accounts of earlier forgeries that had been widely accepted by French scholars, notably the forged stone tools and human bones from Moula Quignon, France, that had been impregnated into a gravel section by workers (McNabb 2012, 45). Many specialists refused to visit Altamira. One of the few who did, Édouard Harlé, made a case that the art was a product of modern forgery (Davies 2009, 132). By 1881, published rejections appeared, along with a continuing lack of interest to directly engage with the site via visitation by established figures (Bahn 1992, 340). While de Mortillet could accept portable art on the grounds of art for arts sake, implying no religious life in early humans, and so simplicity, parietal art represented a challenge to his standing view that religion was not present before the Neolithic and gave the impression of complexity in the Palaeolithic (Bahn 1992, 343-344). 'Fixists', aligned with creationism, anticipating continuity between ancient and modern humans, saw any traces of art as indicative of an early human moral sense and the existence of the religious, in turn indicative that humans had been complex from their very inception (Palacio-Pérez 2013, 685). To conform to a unilinear evolutionary perspective, of a human species emerging gradually over a vast body of time from simplicity to complexity, early humans couldn't possess what equated in Victorian thinking to fine art; art that possessed all the hallmarks of a modern mind engaged in the height of cerebral abstraction, matching that produced by the Victorians themselves (Conkey 2010, 273). It wasn't until 1902 with the publication of Cartailhac's *mea culpa d'un sceptique* that parietal art and Altamira was finally accepted (Bahn 1992, 341; Conkey 2010, 272; Fagan 2014, 37). While a shift in outlook towards the Palaeolithic human mind was critical, this shift in the archaeological landscape of opinion was fuelled in no small part by new discoveries of parietal art across 1895-1902 (Moro Abadía and González Morales 2004), making claims of a hoax pragmatically much more difficult to sustain.

In the interim, anthropology offered a possible resolution to the progress paradox. Across 1850-1900 there emerged a concept of 'the primitive society' (Moro Abadía 2006) and from 1864-1902 there was a use and shaping of 'primitive art', or art produced by ethnographically documented populations, to resolve the paradox of simple people with complex art (Moro Abadía and González Morales 2004). Here, primitive art was grafted to the concept of craft to deflect any traces of possible fine art in non-western or ancient settings away from their western equivalents. The art of non-western peoples, 'peoples of nature', was deemed of historical interest, and of direct pertinence to the origins of art that Palaeolithic discoveries reflected (Leeb 2015). This view flowed from a Victorian sense of non-Victorian societies as primitive, with material culture as directly comparable if similar in type regardless of context (McNabb 2012, 29). It was not until the early 20th century that broad opinion began to shift towards understanding Palaeolithic art pieces to be of so high a standard that they might legitimately be considered masterpieces, though this view was foreshadowed in the portable art by some scholars, such as Peccadeau de l'Isle, whose work at Montastruc will be considered in greater detail in chapter 5 (Moro Abadía and

González Morales 2013; de l'Isle 1868). This conception of art was universalising and heavily Eurocentric, construing all art beyond the western world as primitive, and by extension that of the past (Moro-Abadía and González-Morales 2008, 533). The discovery of Palaeolithic art in Europe, with implications that these may be the forebears of contemporary Europeans, in many respects allowed them to be held in a higher regard than contemporary hunting and gathering populations, which at least in some quarters, such as amongst the polygenists, were construed as living fossils.

2.2.5. Acceptance of Palaeolithic Art: Early 20th Century Categorisation, Typology, and Dating

It is at this time that the division between portable and parietal art – a division still part of the mainstay in contemporary research - was formalised and moved into common usage, bringing the intertwined Victorian conceptions of fine art and craft along with it (Moro Abadía and González Morales 2004). This division was widely supported, variously espoused by some of the most prominent scholars of the day, including Henri Breuil, Louis Capitan, Emile Cartailhac, and Denis Peyrony, and the concepts only increased in popularity over the first half of the 20th century (Moro Abadía and González Morales 2013). The two major categories of Palaeolithic art, parietal and portable, are simultaneously pragmatic and interpretive, with both components being problematic due to the weight these labels wield in influencing subsequent interpretations. There was a perceived cognitive threshold associated with each type of art before the 1980s, parietal art being linked with relative cognitive complexity, and portable art with relative cognitive simplicity (Moro Abadía and González Morales 2013). Parietal art was defined as static, attached to a non-mobile feature of a site, typically the cave wall of cave sites, but was also generally considered to be the more developed, aesthetically accomplished, complex and refined mode of art expression (Moro-Abadía and González-Morales 2008, 538). There was a pervading sense that parietal art was 'art proper', or unambiguous art, and an immediate and direct window into the ritual, symbolic, and social lives of Palaeolithic people, if only its meaning could be decoded (Moro-Abadía and González-Morales 2008, 538). This parallels earlier views of parietal art as 'fine art', an indicator of complexity and modernity, and supportive of an aesthetic sense, cognitive complexity and religion. By contrast, portable art was defined pragmatically as objects that were not anchored to a specific place and could be moved from one location to another. All manner of materials, designs, 'functional' and 'non-functional' objects make up this category (Moro-Abadía and González-Morales 2008, 538). Relative to parietal art, portable art has classically been thought to be merely decorative, especially when present on an otherwise functional object (Moro-Abadía and González-Morales 2008, 538). Beads were initially excluded, thought to be little more than decorative baubles, and have only been integrated into discussions of art in recent decades (White 1992). They now form some of the most significant and compelling evidence for complexity in early hominin species. This emerging typology of art took no account of music and associated material culture, for which there is now growing direct evidence (e.g. Adler 2009; Conard *et al* 2009; Dams 1985), perhaps reflecting attitudes to what did and did not constitute art, much as beads were not deemed to reflect artistic expression.

With an increasing quantity of art, the first half of the 20th century saw attempts to typologise the material, as occurred with an influx of artefacts from excavations in the latter half of the 19th century and the formalising of periods through type-fossils. 1900-1915 saw attempts to categorise and sub-divide by type, such as engraving vs. sculpture (Moro Abadía and González Morales 2013). The major contributions in this area came in 1952 with Breuil's (1952) 2 cycle stylistic framework and 1964 with Leroi-Gourhan's (1964) 4 phase stylistic framework. These were all encompassing, unilinear typological frameworks based on the style of depiction of the art, with parietal art being central, plotting the slow evolution of art from simple to complex (Fagan 2014, 38; Conkey 2014, 270; Moro Abadía and González-Morales 2008). With no way to date the art, these schemes were entirely based on the finished form and its visual character, ensuring these domains were dominant in subsequent analysis and interpretation. 19th century sentiments became woven into the very structure of how art was studied, categorised, typologised, dated and studied, and these frameworks were of such a dramatic shaping influence in the understanding of art that they are routinely referenced in contemporary discussion of art (e.g. Pike *et al* 2012).

2.3. The Beginnings of a Revolution in Art Research?

This rapid sketch of the social milieu in which art was found, how it was fused to larger questions of human (racial) origins, and how it was understood through its visual character and rigid typological categories, linked to a Victorian conception of art, serves to highlight the orthodoxy in how art has been approached. This is evidenced in the immediate trajectory of art analysis into the 20th century with a framework of unilinear art typology and monolithic interpretation. A consideration of art interpretation will further highlight the role of this framework in approaches to art. Before considering the varied attempts to interpret Palaeolithic art, two developments in the 20th and 21st centuries will highlight elements of a difference and sameness in thinking: chronometric dating, and the recent discovery of art in non-human species. In the case of the former, new approaches to directly dating art have revolutionised understanding, encouraging a questioning of style-on-style dating. In the case of the latter, debates surrounding non-human art serves to highlight a clear linkage to elements of this orthodoxy, the playing out of the debate closely mirroring that of the original discovery of art. The adherence to elements of the orthodox approach to art is also revealed to be a point that binds an increasingly diverse array of interpretation of Palaeolithic art. For all of their diversity, interpretations typically conform to many elements of the historic legacy of how art should be categorised and which types of art, and elements of art, are important in interpretation and the assessment of meaning.

2.3.1. The Mid-Twentieth Century: The Rise of Anthropology and Chronometric Dating

The 1960s saw an emerging rejection of the unilinear evolution of art, as well as its Eurocentric and monolithic nature, derived from Art History (Moro Abadía and González-Morales 2008; Ross 2001, 543). In its place was a shift towards the use of anthropology as the foundation for exploring the study of art (Moro Abadía and González Morales 2013).

The 1970s and 1980s saw the questioning of the pervasive and rigid distinction maintained between parietal and portable art, long held to be self-evident truths (Moro Abadía and González-Morales 2008). These developments paralleled broader shifts in thinking within archaeology, first the New Archaeology leading to processual archaeology from the 1960s and subsequently the post-processual critique from the 1980s onwards (Trigger 2007). The character and geo-temporal scope of art also changed as archaeological interest increased beyond Europe. With it came some of the most significant realisations in the contemporary Palaeolithic art debate: the appreciation that art was more than a European phenomenon and the emerging sense that it might also be more than a human phenomenon (Moro Abadía and González-Morales 2008; Ross 2001, 543). With the rethinking of the defining categories of art came the questioning of exactly what material constituted art, such as abstracts signs, cupules, and by the 1990s beads (Moro Abadía and González Morales 2013; White 1992). This was further encouraged by finds in 1995 in the Côa Valley, Portugal, where rock art was found outside of a cave, compounded by a recent discovery of engraved horses in Germany, again bringing into question the classic typological framework and how different types of art were defined (Bednarik 1995; Welker 2016; Zilhão 1995; fig 2.9.). The anthropological influence in art studies fuelled this diversification, especially beads which were identified as centrally important in hunter-gatherer lifeways and increasingly became an indicator of complexity (White 1992; Moro Abadía and González Morales 2008; 2013). With the emergence of chronometric dating from the 1950s a more critical stance was adopted towards stylistic dating. The 1980s saw a diversification in the usage of style from formulating typologies and unilinear narratives, to style as conveying information, eroding strict and literal readings of the visual character of art (Moro Abadía and González-Morales 2008). This has been developed further following pioneering work by White (1992) through an increasing interest in applying the chaîne opératoire to art, exploring production and use (e.g. Farbstein 2011a; 2011b; Moro Abadía and González Morales 2013; Needham 2010).

Figure 2.9.

Figure 2.9. showing newly discovered Palaeolithic rock art discovered in an open-air context in Germany. The discovery of Palaeolithic rock art in the open air challenges the traditional typological system. Image after Welker 2016, 36.

2.3.2. Breaking the Stylistic Circle: The Late 20th Century Chronometric Turn

Radiocarbon dating, introduced into archaeology in the 1950s by Willard Libby (1967), revolutionised the understanding of archaeology. Before this, typologies from often poorly excavated sites were used to place objects in order, by type, often following a unilinear view of progress from perceived simplicity to complexity. Along with more stringent control about the spatial relationship of artefacts within sites, radiocarbon dating allowed for the direct dating of anthropogenic carbon from archaeological horizons, avoiding the circularity of using the style of an object to achieve a date. While these early dates were of course limited, requiring large sample sizes often derived from bulk sampling, the method, and subsequent refinements, ushered in a new phase in archaeological enquiry.

However, this shift towards chronometrics took longer to reach Palaeolithic art and remains an area of heated debate. Art objects were too precious to be sampled for radiocarbon dating, especially when early dating methods required large sample sizes, whether of charcoal from paintings or bone from organic portable pieces, and the resultant date was likely to be inaccurate with significant error ranges. The tradition of interpretation of cultural attribution, and by extension a rough date, based on artistic style continues and is still the dominant mode of dating and analysing art. Pettitt and Pike (2007) note that only around 5% of parietal art has any form of associated dating. Dating by style is inherently circular, relying on the style of the piece to give a date and cultural attribution, and then using this association to interpret further pieces on the grounds of style. von Petzinger and Nowell (2011, 1166, 1178) note that 80% of all European Upper Palaeolithic art is attributed to the Magdalenian but 75% of Magdalenian art has been so attributed on stylistic grounds, demonstrating the magnitude of the problem. This is slightly less problematic for portable art where pieces might be found in association with other artefacts but compounded when applied to parietal art where there is rarely such a connection. With refinement in the radiocarbon method, reducing the required sample size, removal of contaminants with ultrafiltration, correcting for phenomena such as the marine reservoir effect, the development of AMS dating in the 1980s, and an increasingly extended radiocarbon upper dating threshold to cover sites as old as the beginning of the Upper Palaeolithic, the direct dating of art has become viable in some cases (David *et al* 2013, 3; Valladas *et al* 1992, 68; Higham *et al* 2012). The ongoing case of Chauvet cave is perhaps the most famous example and encapsulates much of the ongoing struggle over how art should be dated.

The discovery of Chauvet cave has been a catalyst for vigorous debate surrounding style versus chronometric dating, as it was at other significant Palaeolithic art sites such as El Castillo, Spain, and Niaux, France (Abadía and González Morales 2013; Valladas *et al* 1992). Discovered in 1994, galleries of naturalistic animal depictions are made variously in red ochre and black charcoal, are highly naturalistic, including compositions of horses and lions (fig 2.10.). Stylistic dating has placed the art in the Middle Magdalenian or Solutrean, perhaps around *c.* 15,000-20,000 BP, but radiocarbon dating has suggested the site is more likely of Aurignacian/Gravettian age, with new dating suggesting two phases of occupation between 37,000-33,500 BP and 33,500-31,000 BP (Valladas and Clottes 2003; Valladas *et al* 2001; Quiles *et al* 2016). These dates have drawn significant challenge and critique (e.g.

Figure 2.10.

Figure 2.10. showing a panel of naturalistic animal depictions made in charcoal from Chauvet Cave. Debate has been intense over the stylistic and chronometric dating of the art. Image courtesy of Wikimedia Commons.

Pettitt and Bahn 2003; 2014; 2015; Pettitt and Pike 2007, 36-38; Züchner 2014). Regardless of whether the early dates for Chauvet are accurate, the claim is significant, bringing to the fore an ever-present possibility inherent in stylistic modes of dating that the entire stylistic framework could ultimately be proven flawed with the application of chronometric dating. Chauvet is by no means unique. Indeed, opponents to the early Chauvet dates have themselves discovered earlier than expected dates in Spanish caves. Pike *et al* (2012) used uranium-series disequilibrium dating to date calcite flowstones forming over parietal art in 11 caves across Asturias and Cantabria, northern Spain, yielding new minimum age representations for a raft of cave art (Pike *et al* 2012, 1409). 50 samples were taken and it was confirmed that cave painting was well established in the early parts of the Upper Palaeolithic, with multiple pre-Gravettian dates from a number of sites (Pike *et al* 2012, 1410). This study contributes to a reassessment of stylistic dating, with material at Altamira thought to be of Magdalenian date on stylistic grounds now dating to the Aurignacian, and at El Castillo, depictions thought to be of Magdalenian age now found to be of Solutrean date (Pike *et al* 2012, 1411). The specific application of uranium-series dating to cave art has itself been challenged on the basis that establishing whether a sample stems from a closed system free of contaminants is challenging and can lead to inaccurate dates (Sauvet *et al* 2015), claims that have been challenged by Pike *et al* (2016). This highlights the ongoing tension in the style versus chronometric debate and a lack of consensus as to best practice. It is likely that only a small sub-set of Palaeolithic art sites will be viable for chronometric dating, regardless of method, and a stylistic approach is likely to remain as a significant force in its understanding to some extent (Moro Abadía and González Morales 2007; Pettitt and Bahn 2003, 134; Valladas *et al* 1992, 70).

New ways of engaging with art have been suggested to try and avoid the sole reliance on stylistic typologies that characterised research prior to the 1990s by integrating style and chronometrics, representing the tentative beginnings of a revolution in how art is dated and typologised. von Petzinger and Nowell (2011, 1165) note the limited dates associated with parietal art, and the reliance on classic linear evolutionary stylistic frameworks developed by Breuil (1952) and Leroi-Gourhan (1964) respectively (Rivero and Suavet 2014, 65; von Petzinger and Nowell 2011, 1166). This leads to biases in the attribution of age to new finds, the existing structure taking precedence over the specific attributes of new depictions, with style being used to order style, leading to circular reasoning (von Petzinger and Nowell 2011, 1170). As a response, they advocate the use of well-dated sites with corresponding parietal art as anchor points from which attributes of style might be extrapolated out to other nearby sites until such time as dates can be established for all sites (von Petzinger and Nowell 2011, 1167). This seems to be a viable short-term solution to challenge stylistic circlularity, especially given the prospect that some sites may never be suitable for direct dating. The long tradition of stylistic dating, and utilising universal style driven typologies, can be challenged now the use of chronometric dating methods is viable and causes limited damage to the art. Even if early results are heavily debated, this transition is a necessary one, and moving to a style/chronometric mixed model is essential in liberating Palaeolithic art from a rigid orthodoxy which is deeply entwined with 19th century baggage, which is inherently drawn into contemporary discourse through its continued use.

2.3.3. A 21st Century Progress Paradox: Art beyond Humans, Art beyond Europe

Recent new art discoveries have significantly changed the landscape of Palaeolithic art research and, in accordance with the dating debate, support the growing case for the need for substantive change in how art is approached and understood.

The Palaeolithic art origin story spanning the late 19th century and through into the early 20th century is well rehearsed and frequently recounted. Less well developed is the appreciation of the repetition of this early research pattern across the later part of the 20th century and into the 21st century: our own version of the progress paradox. The core research questions that were the fixation of 19th century research, such as human/not human, simple/complex, art/not art, have been posed anew with the recognition of multiple closely related hominin species, each with their own complex material cultures, some of which debatably reflect an artistic capacity. With the appreciation of a yet deeper evolutionary time frame, millions of years rather than hundreds of thousands, the unilinear view of *human* evolution has been dismantled and has been replaced by a unilinear view of hominin evolution *across species*. In this second progress paradox, the deepest and most resistant dividing line has again been art. It is now intimately bound to cognitive, social, linguistic and symbolic complexity and a defining trait of anatomically modern humans; one invention in a trait list that facilitated human evolutionary success (McBrearty and Brooks 2000; McBrearty 2007). Recent developments in the study of human evolution, paired with recent findings in the last decade, again challenge the received view of any cognitive division between parietal and portable art, or indeed art as a marker of 'modernity' and a distinctly modern human phenomenon. Neanderthals serve as an effective case study in this respect.

There are clear parallels between the early human debates already considered and more recent debates conducted across species in recent decades (Moro Abadía and González-Morales 2008). There has been a clear bias against Neanderthals, from their very discovery in 1856 – once thought to be a missing link between humans and primates (van Wyhe and Kjærgaard 2015, 60) - and throughout the subsequent history of their study, evident in fields as diverse as technical drawing (van Reybrouck 1998) and description (van Reybrouck 2002), to popular reconstruction (Moser 1992; 2001) and literature (Hackett and Dennell 2003). This contributed to a sense of Neanderthal life as quintessentially Hobbesian: nasty, brutish and short (Pettitt 2000, 362). As extinct early hominins, Neanderthals have been rendered simple and savage to safeguard the position of humanity as uniquely the opposite, the winners of the great evolutionary race, the inheritors of the earth. The propensity to still envision models of simplicity/complexity as a trait list of attributes and capacities - a problem also evident in models of gradual vs. late evolution of modern human capacities in Africa versus Europe (e.g. McBrearty and Brooks 2000; McBrearty 2007) - led to arguments for: an incapacity to think in complex or creative ways (e.g. Mithen 1996), an incapacity to bury the dead (e.g. Gargett 1989; 1999), limited working memory capacities (e.g. Wynn and Coolidge 2013), an incapacity to speak (e.g. Mithen 2006), or an incapacity to independently create art or symbolic material culture (e.g. Mellars 2005), to name but a few. Neanderthals have been defined through their supposed extinction; no matter how complex the evidence, they failed to survive and must be somehow lacking in comparison to humans (Zilhão 2012). There are clear parallels with 19th century scholarship, where Palaeolithic and non-western peoples were construed as lacking to safeguard the privileged position of Victorian society at the zenith of biological, technological and cultural evolution.

It is perhaps no coincidence that the majority of claims for Neanderthal art that might be used to demonstrate Neanderthal complexity have been reported after 2010 and the publishing of the Neanderthal genome, evidencing inter-breeding with humans (Green *et al* 2006; Green *et al* 2010). This sudden rise in Neanderthal artistic capacity reflects an increasing liberation from the varied simplicity narratives prevalent before it as a result of the confirmation of gene transfer between humans and Neanderthals (Abi-Rached *et al* 2011; Green *et al* 2010; Prüfer *et al* 2014). Recent finds of Neanderthal parietal art (Pike *et al* 2012; Pike *et al* 2016; García-Diez 2015; Rodriguez-Vidal *et al* 2014), possibly including hand stencils which re-dating has implied may be of an earlier Upper Palaeolithic date (Pettitt *et al* 2015, 40), portable art (Finlayson *et al* 2012; Finlayson *et al* 2014; Marquet and Lorblanchet 2003; Morin and Laroulandie 2012; Rodriguez-Vidal *et al* 2014; Roebroeks *et al* 2012; Romandini *et al* 2014; Peresani *et al* 2011; Pereseni *et al* 2011; Peresani *et al* 2013; Peresani *et al* 2014; Radovčić *et al* 2015; Zilhão 2007; 2012; Zilhão *et al* 2010) and complex treatment of the dead (e.g. Hovers *et al* 2000; Pettitt 2011; Riel-Salvatore and Gravel-Miguel 2013) reinforce an increasing similarity in the capacities of humans and Neanderthals. This is amply supported beyond new discoveries of art, with, for example, evidence of the production of birch bark tar, a highly complex and specialised procedure, at Campitello Quarry, Italy, (Mazza *et al* 2006), and at Königsaue, Germany, dating to the Middle Palaeolithic (Grünberg 2002) and bitumen use, likely to create composite tools, at Umm el Tlel, Syria, dating to around 70,000 years ago (Boëda *et al* 2008).

This challenge is not limited to only humans and their closest cousins. There is mounting evidence for behavioural sophistication in yet earlier species across the Middle Palaeolithic. The recent discovery of a potential engraved shell from Trinil, Java, produced by *Homo erectus* and dating to around 500,000 years old evidences an emerging cognitive and behavioural complexity long before the presence of humans and their contemporaries (Joordens *et al* 2014). The Berekhat ram figurine, Golan Heights, Israel, dating to a minimum of 280,000 years old and also produced by *Homo erectus* supports this interpretation (Marshack 1997; d'Errico and Nowell 2000). While traces of art in early hominins remains scarce, though increasingly varied and complex for Neanderthals especially (Spikins *et al* 2017), this is likely a biased reflection of the true prevalence of such activities; the taphonomic biases acting against preservation of such activity, indeed any activity, will be more apparent with increasing time depth (Bednarik 1994). These discoveries force a shift away from simple presence/absence trait lists and towards developing *contextual* appreciations of closely related but differing practices in equally closely related but different species, in turn undermining the model of unilinear evolution across species (e.g. Burdukiewicz 2014; Hayden 2012; Villa and Roebroeks 2014; Spikins *et al* 2017; Zilhão 2014). Art is no longer a unique hallmark of humanity, or of a uniquely modern human cognitive complexity (Conkey 2010, 281). Instead, a flexible research framework is required that embraces the increasing presence of early hominin art and encourage its study in its specific geo-temporal and species contexts, beyond the limits of its ramifications for early hominin cognition debates alone.

In a similar vein, neither is the geographical scope of Palaeolithic art made by humans limited to the traditional range of the west of Europe. There is mounting evidence for human complexity and art production beyond Europe, likely spreading from Africa during the initial human colonisation from this region. This rise in the range of art beyond Europe has been accompanied by increasing evidence for cognitive complexity in humans long before their arrival in Europe, highlighting the Eurocentrism in the record. Evidence includes ochre/pigment (Dayet *et al* 2013; d'Errico *et al* 2012; d'Errico *et al* 2010; Henshilwood *et al* 2011; Henshilwood *et al* 2009; Hodgskiss 2010; Rifkin 2010; 2011; Watts 2010), beads (Balme and Morse 2006; Bouzzougar *et al* 2007; d'Errico *et al* 2005; d'Errico *et al* 2008; Leavesley 2007; Morse 1993; Vanhaeran *et al* 2006; Vanhaeran *et al* 2013), complex adhesives for hafting (Wadley 2005; 2010; Wadley *et al* 2009; Wadley *et al* 2003), heat treatment of lithics (Lombard 2007; Lombard 2008; Wadley and Prinsloo 2014), decorated objects (d'Errico *et al* 2001; Texier *et al* 2010; Texier *et al* 2013) and complex multi-component tools (Lombard and Phillipson 2010).

At the site of Diepkloof, South Africa, dating to 109±10-52±5,000 BP, 37,534 fragments of ostrich eggshell were discovered, 408 of which show signs of engraving, representing a minimum of 42 decorated ostrich eggshell containers (Texier *et al* 2013, 3413). At the site of Blombos cave, south Africa, dating to c. 77,000 BP, incised geometric lines on prepared ochre pencils no. 8937 and 8938, likely reflecting artistic expression (Henshilwood *et al* 2002; Henshilwood 2007, 126; McBrearty 2007, 137; Mellars 2006, 9382; Vanhaeren *et al*

2006, 1785). The site was also home to 68 worked shell beads, intentionally transported from 20km away and found in several groupings suggesting they belonged to several separate strings of beads, perhaps 100mm long and consisting of up to 24 individuals beads each (d'Errico *et al* 2005, 9; Vanhaeran *et al* 2013, 515). There is also clear evidence for ochre processing and use at the site dating to as early as 100,000 BP, with dedicated toolkits for ochre powder production, mixing and subsequent curation (Henshilwood *et al* 2011). Similar finds of ochre from the site of Klein Kliphuis, dating to between 50,000 and 80,000 BP indicates that this artistic capacity was widespread (Mackay and Welz 2008). The recent re-dating of 7 fragments of polychromatic painted quartzite slabs from Apollo 11, southern Namibia, dating to c. 30,000 BP adds to this growing corpus of artistic expression in Africa (Masson 2006; Rifkin *et al* 2016, 337).

Colonised by at least 45-50,000 BP (Mulvaney 2013, 99) there is growing evidence that at least some of the vast corpus of Australian rock art dates to the Palaeolithic, supporting the notion of a deep history to human artistic expression (David *et al* 2013, 3). There is a growing corpus of indirect evidence for artistic expression, Including the use of ochre in the Lake Mungo burial, dating to 42,000 BP (Mulvaney 2013, 99, 103); the use of pigments as evidenced by ground and faceted hematite at Malakunanja 2, dating between 61,000 ± 13,000 and 45,000 ± 9,000 (Mulvaney 2013, 99; David *et al* 2013, 4; David *et al* 2013, 2493); ground and faceted ochre from Nauwalabila 1, dating to 53,400 ± 5,400 BP (Mulvaney 2013, 99; David *et al* 2013, 4; David *et al* 2013, 2493); a slab of limestone from Carpenter's Gap with a covering of red ochre, dating to around 40,000 BP (David *et al* 2013, 4; Mulvaney 2013, 103); the presence of ochre paint at Chillagoe, dating to at least 30,000 years old (Mulvaney 2013, 103), ochre with traces of anthropogenic modification from Sandy Creek 1, dating to 31,900 +700/−600 BP (David *et al* 2013, 4); and perhaps most convincingly, a painted slab of quartzite from Nawarla Gabarnmang, with recognisable designs, dating to 26,913-28,348 cal BP (David *et al* 2013, 7; David *et al* 2013). Emerging evidence from Asia may serve to begin to connect the two regions. A series of artistisc depictions has recently been dated on the island of Sulawesi, consisting of hand stencils and naturalistic animals, in a network of connected caves (Aubert *et al* 2014, 224). The art ranges from 17,400 – 39,900 years old, with the oldest art found to be a hand stencil from the site of Leang Timpuseng, dating to 39,900 years old (Aubert *et al* 2014, 225). The nearby site of Leang Jarie also had a hand stencil, in this case dating to 39,400 year ago (Aubert *et al* 2014, 225). This further lends weight to the notion that art was a skill that had been mastered by the first colonisers out of Africa and was present in the material culture of those groups that colonised Asia, Sahul and Europe (Aubert *et al* 2014, 225-226).

This serves to demonstrate the need for a fundamentally different way of engaging with art, whether specifically in relation to humans or when trying to understand art in closely related hominins. Debates about early art cannot only be about the cognitive capacities they reflect. As with human art, they reflect a rich window through which we might gain fresh insights into hominin worlds and are perhaps a key area to explore in trying to build contextual 'palethnographies' of early hominins (Conard 1994). The strands of an emerging chronometric turn in art, shifting from a style-on-style model of dating and typology to one of independent points used as anchor points alongside stylistic dating, the recognition of art as a multi-species phenomenon, and the appreciation of art as a multi-regional phenomenon, both of which further erode the orthodox understanding of art as a western European Upper Palaeolithic human phenomenon, point to a growing need for a revised approach to art. A review of interpretations of art points to the same conclusion, with an overly rigid orthodoxy in approaches to art that fixate on the visual and the finished form, linked to received 19th century conceptions of art and how it should be approached.

2.4. Interpretations of Palaeolithic Art

Interpreting the meaning(s) of Palaeolithic art has always been a central pillar of research efforts. The historical milieu surrounding Palaeolithic art is embedded in the trajectory of interpretation, including contemporary research. For all of its diversity, rarely does art interpretation depart from a fixation on the thing depicted and the finished form, decontextualised from a specific time or place. Art is typically conveyed as a monolithic, primarily human, western European, Upper Palaeolithic phenomenon, reflecting elements of orthodoxy in how it is approached, even if the interpretations vary. To review all interpretations of Palaeolithic would be too vast to accomplish in the modest space available. The review of art interpretation presented here is organised chronologically and thematically, with changes in interpretive themes linked to changes in the historical milieu, outlined above. The dominant school of thought in contemporary debate, shamanism, is explored in greater depth. Recent approaches that challenge orthodoxy, typically through the utilisation of non-western insights and a focus on object life history, are outlined as a critique to this dominant position, and as a source of inspiration for a new approach to art.

2.4.1. Art for Art's Sake

The earliest interpretations of art in the 19th century portrayed it as a leisure activity. Art was produced for its own sake, with little pertinence to the broader lifeways of Palaeolithic hunter-gatherers. This position was inspired by the Art Historical influence in Archaeology dominant during the early origins of Palaeolithic archaeology. It directly flowed from 19th century conceptions of art, split between fine art and craft. With an incapacity for hunter-gatherers or Palaeolithic humans to produce fine art, which necessitated true cognitive complexity and abstraction, all artistic expression in the past was reduced to an activity primarily whimsical and playful in nature (Moro Abadía and González Morales 2013; Palacio-Pérez 2013, 694). It also flowed from a period where evolution was still debated as a concept and a perspective of Victorian society as at the zenith of civilisation cast a shadow on the achievement of non-western hunting and gathering peoples. More sophisticated and modified forms of this debate resurfaced in the late 20th century, championed by Halverson (1987), though it gained little traction, being critically received (Abrahamian 1987; Black 1987; Davis 1987; Frost 1987; Layton 1987; Lewis-Williams 1987). This model has broadly been abandoned as a result of several key weaknesses. Its lack of appreciation of art as a complex cognitive, social and symbolic outpouring in the Palaeolithic or the non-western world is no longer accepted. Its treatment of all art in monolithic terms, centred on how it looked, with no appreciation of how it was made or used, or the role of art within a specific social context is limiting. It was the art itself that was prominent in the interpretation; there was no consideration of manufacture, of the locality of the art, of its use or decommissioning. All art could be understood as being used for the same purpose regardless of its specific origin or context.

2.4.2. Sympathetic Magic

A more refined model emerged in the beginning of the 20th century, championed in the first instance by Solomon Reinach in 1903 (Lewis-Williams 2014) and later Henri Breuil (1952). Arguments for sympathetic magic were ethnographically derived, reflecting a growing awareness of animistic and totemic worldviews (Palacio-Pérez 2010). In this approach, art was taken literally, with the animals depicted reflecting the animals targeted in the hunt. The ritualistic killing of the animal in art was thought to increase the likelihood of a successful hunt of the same animal in the world. Art was borne of a pragmatic purpose, the desire to control and acquire game, with no ramifications for cognitive or spiritual complexity (Sieveking 1979, 55). In this sense, it continues in many of the 19th century assumptions present in the art for art's sake argument that went before it. It similarly focuses on how the art looks, extrapolating a monolithic interpretation from this alone and with little regard for context. This interpretation partly fed on the perceived naturalism of artistic depictions, being interpreted as the realistic rendering of real animals to facilitate control over them (Palacio-Pérez and Ruiz Redondo 2014, 261). The presence of 'darts', lines cutting across animal figures, was taken as evidence of this interpretation, reflecting the symbolic killing of the animal depicted. The presence of some clay animal depictions deep within caves, such as at the French Magdalenian cave sites of Montespan and Niaux, have been interpreted as support for this view, noting the potential ritual killing of the animal in the art, with perforations thought to reflect the throwing of darts at the art (Sieveking 1979 141-145; fig 2.11.).

Figure 2.11.

Figure 2.11. showing an engraved bison made in soft clay at the Magdalenian cave site of Niaux, France. The holes in the chest were thought to be evidence of spear thrusts, supporting a sympathetic magic interpretation, but were later proven to be natural. Image after Alpert 2012, 4.

While more sophisticated than earlier art for art's sake arguments, the interpretation is flawed due to a lack of corroborating evidence from the faunal record from sites in which art is found. There is rarely, if ever, a direct metrical correlation between the animals hunted and the animals depicted (Lewis-Williams 2014). Without such an association, the literal reading of art as hunting magic, the symbolical killing of a specific species of animal before hunting that same species in the world, is unconvincing. Furthermore, the depiction of hunting scenes or animals that are dead or dying, a perhaps reasonable expectation in a medium that is argued to have facilitated the hunting and killing of animals, is relatively rare in all forms of Palaeolithic art (Sieveking 1979). The presence of fantastic animal forms, whether the fusion of animal and human elements into therianthropes, or the creation of unrealistic 'monstrous' forms that do not correspond to real animals, such as at the Magdalenian site of Pergouset, France (Lorblanchet and Sieveking 1997), suggest a greater diversity of form and perhaps purpose to the art (Palacio-Pérez and Ruiz Redondo 2014).

Claims for the ritual killing of animals made in clay deep within caves by throwing projectiles has with subsequent analysis proven to be the product of natural taphonomic action, invalidating this line of evidence (Sieveking 1997, 141-145).

While this line of interpretation has largely been abandoned, though it is still favoured by some (e.g. Keyser and Whitley 2006), the broader approach of exploring the record with inspiration from non-western worldviews has become increasingly popular in the latter half of the 20th century and into the 21st century, not least shamanistic interpretations, considered below. This is perhaps linked to the increasing shift away from an art-historical to an anthropological influence in art interpretation that this approach reflected.

2.4.3. Race and Sex

Anthropomorphic figurines (fig. 2.12.) are a common component of the Palaeolithic art corpus from the Aurignacian, for example the ‘Venus’ of Hohle Fels dating to minimally 36,000 BP (Conard 2009), through to the latter stages of the Palaeolithic, at sites such as Wilczyce in Poland dating to 15,300 cal BP (Fiedorczuk *et al* 2007). They are found as far removed as Creswell Crags in the UK (Bahn and Pettitt 2009) and Mal’ta and Buret’ in Siberia (Medvedev 1998a, 126-129; 1998b). The specific style of the form depicted varies considerably (Needham 2010), with two notable sub-types, the ‘Willendorf’ style and the ‘Lalinde/Gönnersdrof’ style, divided by morphological style and time (Gaudzinski-Windheuser and Jöris 2015).

Figure 2.12.

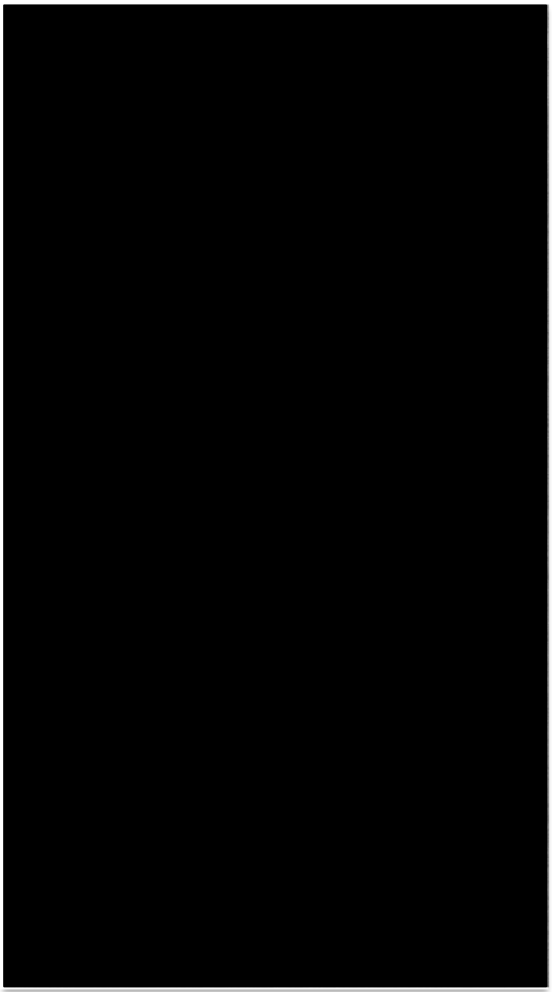

Figure 2.12. showing the ‘Venus’ of Willendorf. This has been a classic example used to support sexual and racial interpretations of Palaeolithic art based on its so-called ‘steatopygic’ features and lack of facial characteristics. Image after Marshack 1991, plate 1.

Figurines were amongst the earliest discovered pieces of Palaeolithic art. The first example was discovered by the Marquis de Vibraye in 1864 at the site of Laugerie-

Basse and was named the *Vénus Impudique* for its naked appearance (Moro Abadía 2015, 4). They have drawn significant interest ever since. Early figurines attracted problematic interpretations in the early 20th century, with figurine morphology being used to build a racial connection to contemporary African populations, based on a perceived corollary between the body features of modern women and the 'Venus' figurines (Nowell and Change 2014, 563; White 2006, 276). African groups were of special interest in this line of argument as they were thought to share quite specific features with the figurines, such as large buttocks and pendulous breasts, a position favoured by Édouard Piette (White 2006, 278). Of special interest was the 'Hottentot Venus', Saartjie Baartman, a Khoisan woman of African origin toured as a living exhibit across England and France, discussed above. In Édouard Piette's scheme, she was thought to reflect living evidence of a racial connection between Palaeolithic people and modern African peoples, with her anatomy evidencing the primitive status of both non-western and non-modern peoples (White 2006, 278). Here again, the Victorian social milieu looms large in the interpretation of art, highlighting how it was interpreted to fit emerging evolutionary theories. While far distant from racial arguments, figurine morphology continues to attract central attention in figurine interpretation, with arguments discussing, for example: possible obesity (Trinkhaus 2005), possible steatopygic fat deposits (Duhard 1991), hypertrophy of the breasts (Harding 1976), demographic stages of womanhood (Rice 1981), or female self-depiction (Hodge McCoid and McDermott 1996; McDermott 1996). A fixation on the visual and a literal translation of that morphology has shaped interpretation of figurines from their very discovery and remain the primary interpretive attribute in contemporary research (Needham 2010). A sole fixation on the visual can be blinding. When research has been diverted away from the visual in isolation, fascinating trends have emerged. For example, in the Gravettian of central Europe, figurines were intentionally destroyed, whether via combustion (Klíma 1954; Soffer *et al* 1993; Vandiver *et al* 1989; Vandiver *et al* 1990) or by heavy hammer blows, especially in eastern Europe (Abramova 1967; Gvozdover 1989; 1995).

That many of the objects display nudity in explicit detail has also formed the basis of a further line of interpretation: sexuality. Absolon's (1949) theory of a "Diluvian plastic pornography" was the first to link the figurines with a notion of an explicit sexual motivation for art production. In this line of argument, the exaggerated genitalia, breasts and buttocks present in some 'Willendorf' style figurines were held to be the focus of interest for the exclusive creator and consumer of the figurines: men. This early notion of men as the sole creators of art was highlighted in Figuier's reconstruction, where only adult men were depicted (Fig 2.7.). Hyperstylised representations, where certain anatomical features such as breasts are represented to the exclusion of all else, were thought to support this view (Absolon 1949, 208). This line of argument has seen a recent resurgence in the last decade, both in academia and in more popular forms of media (Nowell and Chang 2014). Guthrie, arguing from a biological perspective, has made the bold assertion that the majority of all Palaeolithic art, regardless of type, was likely made by young males, expressing their preoccupations, with sex chief amongst them (Guthrie 2005). An analysis of the waist to hip ratio of the figurines, based on photographs, was used to spuriously link the supposed proscribed modern aesthetic ideal, 0.7, to the figurines. Dixson and Dixson (2011) developed this approach further using psychological and neurological approaches. They had a male university student population rank figurines based on aesthetic appeal and then assess a selection of figurines with eye tracking software, assessing where the gaze would most frequently rest. Analysis of casts of those same figurines has proven this study deeply flawed, with figurines often wildly diverging from this aesthetic ratio (Nowell and Chang 2014). Later incarnations of this line of argument focus more on the emergence of gender divisions and the role of material culture in that process rather than sexual satisfaction alone (Taylor 1997; 2007; 2008). There has been a recent diversification towards the exploration of sex alongside health, with interpretation of some art pieces as naturalistic depictions of male sexual organs, reflecting medical ailments in some cases (Angulo and Garcia-Diez 2009; Angulo *et al* 2011).

Such approaches are deeply flawed, being hetero-normative and displaying little awareness of the archaeological record. The use of a fabricated reconstruction used in the eye tracking study of Dixson and Dixson (2011), and measurements derived through measuring photographs by Guthrie (2005) have been proven methodologically unsound. Further, there is no a stable morphological pattern, with a great deal of spatial and temporal variance, as well as divergence from the Willendorf ideal. Examples from Mal'ta and Buret, Siberia, depict fully clothed realistically proportioned humans, for example (Medvedev 1998b). The imprints of textile evident on figurines from Dolní Věstonice have been taken as evidence for woven fabrics during the Palaeolithic (e.g. Soffer *et al* 2000) but could also indicate perishable clothing for the figurines themselves (Needham 2010). A lack of consideration of the life history of the figurines and a fixation on their appearance in isolation, leading to monolithic arguments that incorporate all human figurines, has again strongly influence how the art has been interpreted (Needham 2010).

2.4.4. Art as Symbolic: Structuralist Approaches

With the rise of structuralism in archaeology came interpretations of art inspired by its capacity to characterise the world in terms of a broad, universal, structuring symbolic schema. This approach was famously explored in the context of parietal art in the 1960s by Leroi-Gourhan and Laming-Emperaire, with the work of the latter being truly structuralist and in turn influencing the work of the former (Moro Abadía and Palacio-Pérez 2015). Interpretation progressed inductively, eschewing the use of ethnography and instead allowing the art to speak for itself by virtue of its character, positioning within a cave and spatial relationship with other pieces of art (Leroi-Gourhan 1982, 43). This was a significant development in theoretical approaches to Palaeolithic cave art due to its extrapolation beyond the art to consider the broader social context and art's role in a Palaeolithic social milieu. It was also pioneering in its attempt to interpret groups of depictions within their spatial setting, and so had an appreciation of the importance of space and the relationship between different pieces of art, shifting away from the interpretation of each motif as a discrete entity. In their schema, the most common Palaeolithic cave art motifs, horse and bison, came to be understood as symbolic of male and female, supposedly supported by statistical analysis (Leroi-Gourhan 1982, 60). This approach is a marked shift from earlier strands of interpretation, with some regard for context and variation within specific caves as shaping interpretation. There was also a clear complexity to art production, reflecting a symbolic capacity equaling that of contemporary humans. This development came at a time when archaeology itself was shifting with the New Archaeology and saw an increasing influence from Anthropology (Trigger 2007).

The approach was vigorously critiqued almost as soon as it had been published (Ucko and Rosenfeld 1967). Despite significant development and a growing sophistication in the interpretation of the art, structuralist approaches were found lacking. Key amongst these limitations was a mismatch between Leroi-Gourhan's and Laming-Emperaire's efforts, producing interpretations of horse/bison symbolic schema with exactly opposite meanings. Leroi-Gourhan argued for a symbolic code of male as equating to horse, female as equating to bison, while Laming-Emperaire argued for a system of male as equating to bison and female as equating to horse (Lewis-Williams 2014). A recent genetic study reveals a further problem. Analysing the DNA of ancient bison, Soubrier *et al* (2016) demonstrated the Palaeolithic origin of the European bison (wisent), as well as noting that attributes of bison depiction in cave art typically construed as stylistic variance reflected the naturalistic depiction of different but closely related species (Soubrier *et al* 2016). The lumping of bison into a symbolic category does not reflect that bison art reflects two closely related species. This potentially impacts upon the interpretation if a species truly was symbolically coded: three species were used to encode two symbols. The appreciation of art within a wider context, even if only working through the visual and the finished form, stands as an important transitioning point towards a new way of approaching Palaeolithic art, being more mindful of its context. However, the art was still considered as a monolithic entity, the symbolic schema produced thought to be universally applicable.

2.4.5. Art as Information

The 1980s and 1990s saw a shift in approach towards understanding art as a mechanism for conveying information (Barton *et al* 1994; Clark *et al* 1996), likely inspired by debates on style derived from Anthropology (e.g. Sackett 1985; Wiessner 1983; 1985), highlighting its dominant position as a source of inspiration for Archaeology at this time. This approach drew attention to the social significance of art and how it might have been used to mediate social relationships. Whether indicative of groups coming together, as argued by Conkey (1980) and later Rice and Patterson (1996), or as a means of mediating social relationships between more distant groups, as argued by Gamble (1982) and more recently by Gaudzinski-Windheuser and Jöris (2015) and Mussi (2015), the implication is perhaps the same in that the art carried encoded meaning that facilitated communication and cohesiveness, transmitting a sense of identity across groups. Gamble (1982), for example, used anthropomorphic figurine morphological variance to suggest that art was a tool used in socio-political relations at the inter-group level, mediating the formation of alliances between geographically diverse groups (Gamble 1982, 103). This need was thought to be in part generated by the harsh weather conditions Palaeolithic peoples would have experienced during the Gravettian, the time range from which many of the figurines are thought to date (Gamble 1982, 103). The physical features of the figurines, such as exaggerated breasts and buttocks, were encoded symbols which betrayed the geographical and cultural origin of the figurine, in turn making them a useful tool in inter-group interactions (Gamble 1982, 98). Conkey's (1980) case for aggregation follows much the same principles, arguing that a diversity of art at a given site can be used to infer the presence of multiple groups from diverse regions, aggregating and exchanging information, noting mega sites such as Isturtiz as clear examples of her case (Conkey 1980). This approach became increasingly popular with portable art, its portability facilitating its primary role of transmitting information to others. A case has been made that an information exchange role for art encourages a view of parietal art as a learning aid, transmitting ecological knowledge to younger members of the group via highly naturalistic and detailed animal depictions (Mithen 1988a; 1988b).

While the transmitting of information to an audience using art seems likely as a component part of at least some of the art some of the time, at odds in these models is the scale suggested. These models again make the case for art as a monolithic entity, in which all art, regardless of type, time or place, worked in the same way, to transmit information to members of the same or other groups. In such models, the art itself almost becomes inconsequential. The thing depicted could have been anything to hand as long as the symbolic schema was shared and the information was encoded in form so it could be readily discerned. Yet, this is at odds with regional practices and variances, as discussed in relation to 'Venus' figurines above, and the very careful detail of depiction and often immediacy of the art linked to its locality. There is often an organic relationship with the support or the cave wall (Clottes 2013), with the form negotiated rather than imposed, the rock as living membrane (Lewis-Williams 2002), arguing against the rigid imposition of a universal symbolic schema that would have to be rigidly uniform or risk the loss of encoded information.

2.4.6. Cognitive Approaches: Shamanism and Altered States of Consciousness

The shamanic interpretation of art was initially outlined by Lewis-Williams and Dowson (1988) and has been subject to revision and expansion thereafter (e.g. Clottes 2005; 2013; 2016; Froese *et al* 2014; Lewis-Williams 1995; 2002; 2004; Lewis-Williams and Clottes 1998) The shamanic argument is broadly aligned with a cognitive approach to archaeology (Renfrew 1994) and is based on an appeal to neurological universality, notably the nervous system, which evolved early in human evolution and has likely been much the same for all humans through time, providing a key bridge to ancient humans and their experiences (Lewis-Williams and Dowson 1988, 202). This marks a significant departure from those earlier interpretations of art already discussed, with Palaeolithic humans thought to be fully modern in their cognitive capacities. This is the basis for claims that altered states of consciousness (ASC), brought about through various methods of inducing hallucinations, are universally experienced and can be plotted in predictable stages, the visual manifestations of which shape the art produced in the Palaeolithic (Lewis-Williams and Dowson 1988). The routeways to hallucination are varied, ranging from rhythmic clapping, singing, dancing and drumming, to sensory deprivation, to the ingestion of hallucinogens (Lewis-Williams and Dowson 1988). This argument is augmented by a heavy reliance on ethnographic research, especially Lewis-Williams' extensive research of the San peoples of South Africa and the association of shamanic trance dances and the production of rock art (e.g. Lewis-Williams 1995a; 1995b; 1999; 2003; 2005; Lewis-Williams and Pearce 2012). Several types of sensory experience were thought to be important in influencing Palaeolithic art that are said to be universally experienced by those in trance: entoptic phenomena, or visual sensations deriving from the optic system, sub-divided into phosphenes, or stimulus from within the eye, and form constants, or stimulus from beyond the eye itself (Lewis-Williams and Dowson 1988, 202). These are separated from hallucinations proper, which are structured by neurology but shaped by socio-cultural factors (Lewis-Williams and Dowson 1988, 202). In practice, entoptics present in the visual field as moving arrangements of lattices, hexagons, parallel lines, dots, flecks, zig-zags, catenary curves or filigrees (Lewis-Williams and Dowson 1988, 203). To assess the process of hallucination, data collected from participants under the influence of LSD was considered, with three main stages of trance recognised, linked to the development of mental imagery: stage 1 in which entoptic phenomena are experienced in isolation, stage 2 in which entoptics are made intelligible by the participant by forming the assortment of entoptics into iconic forms to generate recognizable images, and stage 3 in which participants experience a tunnel or vortex surrounded by entoptics (Lewis-Williams and Dowson 1988, 203-204).

In application to Palaeolithic art, this interpretation is claimed to account for more of the variance and specific types of art depiction than others that have gone before, accounting for the presence of signs, otherwise difficult to interpret, and therianthropic forms which are thought to depict shamans (Lewis-Williams and Dowson 1988, 212; fig. 2.13.). The cave is portrayed as more active in the formation of the art, being a locus for sensory deprivation but also a vivid, active, evocative surface that was incorporated into the art produced (Lewis-Williams and Dowson 1988).

This approach has added important lines of argument to the Palaeolithic art debate. Of importance is the appreciation that the support upon which the art was produced was often active in the form of the art, with the incorporation of fissures, cracks or undulations in the rock into the form of the art (Lewis-Williams and Dowson 1988). That many parietal depictions incorporate natural features of the rock surfaces to enhance the design has been linked to trances in which animals were seen and then drawn in real space, linking the natural features on the cave wall to the features of the animals in the trance. Along with the overt rejection of the unilinear evolutionary view of art, there is the appreciation in using detailed ethnographic work that the modern western gaze has limited and blinded researchers to certain lines of enquiry, the above being just one, that are pertinent to interpretation (Lewis-Williams and Dowson 1988, 213, 216).

Figure 2.13.

Figure 2.13. showing the therianthropic 'lion-headed man', found in Hohlenstein Stadel cave, Germany, dating to 39-41,000 cal BP. Such depictions have been used as support for a shamanic interpretation of Palaeolithic art. Image after Kind *et al* 2014, 137.

While this explanation has gained popularity and represents the dominant model in contemporary research, it has been the subject of heated and vigorous critical exchange (e.g. Clottes 2004; Dowson 2009; Helvenston and Bahn 2003; 2004; Hodgson 2000; Lewis-Williams and Dowson 1990; Pearce 2004; Ross 2001; Solomon 2006; Wilson 2004). While the model has made significant advances in approaching Palaeolithic art, there are limitations. This line of interpretation is geared towards later Palaeolithic art and modern humans. Despite recent elaboration and defense of the shamanic approach (Clottes 2016), there has been no discussion of how shamanism articulates with an artistic phenomenon that runs across species.

Shamanistic interpretations are underpinned by the concept of neurophysiological universality amongst contemporary people but also into deep time and the Palaeolithic (Hodgson 2000, 867). This is a simultaneous point of strength in such arguments but also a point of weakness. While an appeal to basic shared neurophysiological structures is a valid one, it at the same time brings into question the need for the shamanistic component of the interpretation (Hodgson 2000, 867). Art that may have been influenced by phosphenes transcends humans and can increasingly be identified in early hominins, where a shamanistic interpretation is potentially less applicable (Hodgson 2000, 867). Bahn (1988, 217) notes that some of the forms that are claimed as entoptic might simply be base elements to be expected in any drawing, such as groups of lines or curves. At least some of the art claimed to be shamanic, such as dots in association with horses (Lewis-Williams and Dowson 1988, 207), may actually be naturalistic depiction, with a recent genetic study, for example, suggesting at least some horses might have been spotted in the Palaeolithic (Pruvost *et al* 2011). This suggest that depictions of animals are at least in part inspired from observations derived from the real world and direct experience rather than trance.

Claims to universality always require scrutiny. The claim for a universal nervous system is no doubt justified, common to humans and well beyond into mammalia (Lewis-Williams and Dowson 1988). However, this should be proven through a diversification of human samples rather than assumed. Recent psychological studies (Henrich *et al* 2010a; 2010b) have demonstrated that the overwhelming majority of neurological and psychological studies limit their sample to western participants. By doing so, the universality of a give trait is assumed, not strictly proven. This is similarly the case for the sample used to model hallucination in which patients were under the influence of chemically induced hallucination via LSD ingestion (Lewis-Williams and Dowson 1988, 204). It would be preferable to explore comparable quantitative studies not only using different mechanisms for hallucination inducement but also in other cultures (Consens 1988, 221), running alongside non-western neurological studies. This would create a stronger evidence base, a minimum requirement in a data-led demonstration of universal applicability.

The cave sites considered are not representative of the full art corpus, with increasing art found in the open air, such as the Côa valley petroglyphs, Portugal (Aubry *et al* 2010; Bednarik 1995; Zilhão 1995) and mobile art is often found on open air sites with evidence for occupation (White 2003), bringing into question the importance of dark cave environments. The social role of shamans isn't elucidated, though limitation to access in some caves implies potential social status (Lewis-Williams 1988, 204). However, there is at least some evidence for a diverse array of people within caves, including young people in the form of handprints and footprints, suggesting access may not have been limited (e.g. Sharpe and van Gelder 2006; Van Gelder and Sharpe 2009).

Many of the most significant advances made by this model, that of the appreciation of the support and the biases of the western, don't specifically require a shamanic model but rather a non-western model; the production of art is not inevitable in the presence of shamans or of entoptic phenomena and art is found in societies where such specialists are lacking (Layton 1988, 226). It should be noted that 'shaman' within the ethnographic record is not a universal role in non-western societies, manifesting in variable ways. For example, among the Siberian Yukaghirs, all members of the group might be considered shamans that periodically engage in forms of shamanic practice, but there is no association with art production or of differential social status (Willerslev 2004; 2007). The idea of a specific group or class of specialists may not be appropriate in the Palaeolithic, 'shaman' can simply equate to 'person'. There is little in the way of clear evidence for the presence of shamans in the broader material culture of the Palaeolithic, such as burials, though there are claims for shamans based on unique assemblages of grave goods in the later Mesolithic such as at Bad Dürrenberg, Germany (Porr and Alt 2006) and Hilazon Tachtit, Isreal (Grosman *et al* 2008), perhaps suggesting they might be archaeologically recognisable but genuinely lacking in the Palaeolithic.

2.5. Summary: The Need for a New Approach

Palaeolithic art will always remain a challenging category of material culture to research. This has led some researchers to call for the abandonment of attempts to interpret art altogether, ushering in an undercurrent of skepticism and pessimism into debate; that art can never be understood (Bahn 1988) or can never be explained from a single perspective or interpretation (Conkey 1987). The varied approaches to art discussed highlight an orthodoxy in how Palaeolithic art is approached and understood, fixating on the appearance of art in its finished form to provide insight into meaning. This position, which permeates most approaches to Palaeolithic art, has its roots in the very discovery and early study of art, shaped by 19th century conceptions of art and the need to understand it within a society in flux as a result of broader debates in evolution and human antiquity. A respect for tradition and those scientists who discovered art can be blinding, with an overly respectful stance to this early work descending into 'hero worship' (Moro Abadía and Pelayo 2010). As a result, much of the outcome of art study is fixed and predictable, limited by assumptions about how art should be approached. It is variable from interpretation to interpretation, but predictable due to the orthodoxy that has shaped the manner in which the art is approached. This has led to an undercurrent of sameness that runs through the diverse approaches to the art record.

In reviewing the historical context of the discovery of Palaeolithic art, the stirrings of this orthodoxy were made visible, with art wedded to Victorian notions of the non-western, non-modern primitive and an artistic schema that split 'fine art' from 'craft', 'parietal art' from 'portable art' (Moro Abadía 2015, 2). Art is typically approached from a visual perspective: how the art looks is assumed to be the locus of meaning, alongside the finished form, with much interpretation respecting classic stylistic typological frameworks that again reference the visual character of the art. Undercurrents of sexism and race also permeated early research efforts and this again stems form the very origins of Palaeolithic art research. Models have typically treated art as a monolithic entity, each model designed to explain all art in its myriad forms across time and space. This again reflects an early research framework in which the world was young, sites poorly excavated, and Palaeolithic sub-periods ill-defined, often stripping art of its context, perhaps in part necessitating this reliance on interpretation based on the appearance of the art.

With increasingly convincing discoveries of art in non-human species, especially Neanderthals, but perhaps also *Homo erectus* and *Homo heidelbergensis*, orthodoxy again took hold and a new-wave progress paradox has limited discussions of these finds to simplicity/complexity in relation to human capacities, the presence or absence of a symbolic capacity or cognitive complexity. This mirrors the very earliest debates surrounding Palaeolithic art in which the humanity of non-western and non-modern humans was brought into question. Art can now be considered a multi-species phenomenon, with independent manifestation of artistic expression in different hominin species (Moro Abadía and González Morales 2010). Evidently these capacities need to be established in early hominin species, but art is not a unique signifier, and to limit analysis of the art in this domain is to repeat the progress paradox; there is a need to explore beyond the cognitive and symbolic and to consider social and cultural significance, in context, of such discoveries and to explore the evidence at different scales, within species, not just across species in monolithic terms.

Is it really inevitable that Palaeolithic art can't be understood and interpreted, or does the structure through which we study it, the orthodox approach, prevent the capacity to reveal meaning? Does the assumptive framework - which has been woven around art for over a century - prevent the understanding of its true nature? Are interpretations reflective of a western worldview, our own conceptions reflected back at us, or really reflective of how Palaeolithic people understood art and its role in their world? These problems are not insurmountable and there is growing cause for a cautious optimism in Palaeolithic art research (Lewis-Williams 2014). With a rise in high resolution, non-destructive or minimally destructive techniques, such as AMS dating, uranium series dating, 3D modeling, pXRD, PXRF, microscopy, photogrammetry and raman spectroscopy, art can be studied in unprecedented detail and at minimal risk to the art itself. Such techniques facilitate a deeper appreciation of how art was made, as well as the social gestures and techniques involved, facilitating a new wave of research that explores the life history of art (e.g. Farbstein 2013; Fritz and Tosello 2007; Fritz and Tosello 2011; White 2003). This makes the answering of calls to study the diversity of art at a smaller scale to extrapolate meaning (Conkey 1987, 419; Fritz *et al* 2016) a more viable route of analysis than in previous decades. Similarly, advances are being made in the theoretical, with the relationship between humans and animals becoming an increasing point of interest, following the exploration of non-western ontologies detailing human/animal relations in Palaeolithic art

(Dowson and Porr 2003; Piprani 2011; Porr 2015; Porr and Bell 2012; Porr and de Maria 2015). The central focus on the visual is also relaxing, with emerging multi-sensory interpretations of art, such as the significance of touch (Pettitt *et al* 2014) and sound (Diaz-Andreu *et al* 2014; Rifkin 2009). With a subject matter as complex and challenging as art, both rigorous techniques and creative theory are needed in its analysis and interpretation. As interest grows beyond classic lines of analysis, a coming together of rigorous method to answer theoretically informed questions could form the next significant phase of art analysis. This bringing together of theory and technique to explore beyond the visual and the finished form, to explore the making, using and decommissioning of art within a specific social and cultural and context is the subject of the next chapter.

Chapter 3. A New Approach: Object Biographies in Non-Western Perspective

Chapter 3. A New Approach: Object Biographies in Non-Western Perspective

3.1. Introduction

In a period as temporally and geographically vast as the Palaeolithic, the temptation can be to focus exclusively on the large, geological scale and interpret through a 'grand narrative' approach, trying to create a model to explain a complex phenomenon in all its spatio-temporal manifestations. This was evident in chapter 2 where the majority of approaches to Palaeolithic art approached the material as a monolithic entity that can be explained through a single interpretation. However, the human timescale is just as critical in the Palaeolithic, though subject to less attention (Bailey 1987; Burke 2008, 136). The human timescale is challenging, especially as such an approach is more heavily reliant on context to build a picture of how specific hunter-gatherers negotiated their world. Art is significant in this respect, providing a sense of how particular hunting and gathering communities understood the world around them (Taçon and Chippindale 2008, 82). This chapter explores an alternative to interpretations of Palaeolithic art that have gone before. These approaches, working through an assumed and often inherent western worldview, have focused on the visual - how the art looks - and the finished form in Palaeolithic art. What follows is an exploration of the biographical approach to material culture, infused with insights from non-western worldviews as an alternative. These elements, alongside advances in non-destructive techniques such as 3D modeling, can act as important structuring components in new approaches to art, moving beyond the limitations imposed by western orthodoxy implicit in much of Palaeolithic art study. Consideration is give to how these insights can be employed to inform a new approach to the art from Montastruc.

3.2. Introducing the Need for A Relational and Contextual Approach to Palaeolithic Art

The attempt to limit the modern western from models of Palaeolithic art is perpetually challenging yet necessary. Chapter 2 highlighted the deep roots of the discovery and interpretation of Palaeolithic art. This tradition has crystallised into orthodoxy in how art is defined, approached and understood. This orthodoxy is aligned with an implicit western worldview in which art is understood as an entity for which the locus of meaning can best be sought in a fixation on the finished form and when approached as a visual medium, the rubrics of art interpretation. While these are clearly important components to any interpretation of art in the Palaeolithic, indeed art in general, such an outlook does not afford a comprehensive understanding of how art was variously made, used and deposited in different times and places. This chapter outlines an alternative approach based on elements of non-western understandings of the world, broadly termed *relationality*. The typical focus of relational approaches within anthropology - humans, animals, things and their mutual relations (e.g. Watts 2013 and papers therein) - makes for a clear resonance with some Palaeolithic art. In Palaeolithic art, *humans* are implicated in the creation of *animal* forms on a diverse range of supports, *things*, creating complex human/animal/thing relations.

Care is needed in the use of the anthropological record. It is best used to *inspire* approaches rather than crudely superimposed onto the archaeological record. Existing relational approaches cannot be directly superimposed over Palaeolithic art or art bearing sites. Equally, any results generated from a relational approach applied to Palaeolithic art, and specifically the art of Montastruc in this case, cannot be directly superimposed onto other contexts: this would be self-defeating and serve only to create a parallel monolithic argument of Palaeolithic art insensitive to context.

A relational approach is necessarily a contextual approach. It is specific, with the outcome potentially as varied as the sites and periods to which it is applied, linked to the historical, research and archaeological contexts encountered. This is not to say that a relational approach does not have broader implications and relevance, quite the contrary. However, a distinction must be drawn between the approach and how it was generated for application to a context and the approach *as applied* to a context, which might only be pertinent to the context for which it was conceived. The former is subject to manipulation and application freely in other contexts, while the tailored approach, the product of that application, should be used with greater consideration of the specific contexts encountered. The act of context building on a case-by-case basis is essential to a relational approach and will provide a truer sense of how it can be applied to a specific collection rather than the use of, in this case, the Montastruc model wholesale. Correspondingly, advocacy is given to the creation of many contextually specific relational approaches rather than a general relational model applicable to all. This sensitivity to context does not invalidate comparison or the exploration of themes across different types of material culture or across sites within a region or beyond. However, such comparisons would clearly be at their strongest with an equally complex reading of context in those sites being compared. In essence, synthesis should not precede complex contextual analysis, but this analysis should not be a substitute for eventual synthesis.

3.3. The Implicit Western Worldview as a W.E.I.R.D. Way to Explore Palaeolithic Art

Much of art analysis and interpretation is approached from an implicit and particular way of viewing the world: a *W.E.I.R.D.* (Western, Educated, Industrialised, Rich and Democratic) worldview (Henrich *et al* 2010a, 2010b). This worldview is fuelled by science, which gives a sense of certainty and permanence to research. Science in turn has its roots in the same Enlightenment thinking which fuelled the discovery of both the Palaeolithic and Palaeolithic art (chapter 2). Much of Enlightenment thinking, including advances in natural history, evolution, geology, dating, Linnaean classification (Humphries and Huxley 2007) and Cartesian mind/body division (Descartes 2000 [1641]) during this period (Olsen 2007, 580), are the intellectual foundations of a contemporary western understanding of the world.

The very scientific endeavours responsible for the discovery and appreciation of the Palaeolithic can, as a result of their acceptance in contemporary western science as unassailable truths, act to limit the field of view in the ever-challenging search for meaning in Palaeolithic art. The W.E.I.R.D. worldview is one that does not apply universally today and there has been little in the way of critical evaluation or explicit reasoning of its implicit application to Palaeolithic archaeology. Instead, the assumption is of a factually accurate western worldview, reflecting objective reality, with the scientific truths upon which it is based being universally applicable. For a contemporary western scientist studying the Palaeolithic, this position is a seductive one: universality creates a safe footing upon which to build interpretations that can transcend time and space, facilitating synthesis. However, for Palaeolithic humans, these central structuring principles of modern western life may have held no sway in how they understood and negotiated the world. The uncritical, inherent application of elements of a western worldview to the Palaeolithic is akin to a silent, unquestioned and pervasive direct analogy. This realisation poses challenges as to how to approach the past. Questions of worldview are given little critical attention in prehistory, in part because the western model is implicitly embedded in research carried over into the past wholesale, and interpretations which try to embrace this variance are avoided, assumed to sit on the very highest rungs of Hawkes' (1954) ladder of inference. However, the western framework has the potential to render aspects of Palaeolithic art invisible and it must be brought into question to allow for the full assessment of a complex phenomenon made by a distinctly different culture (Malafouris 2007, 287). The building of models through a strictly empirical framework can be self-serving, feeding into a contemporary western worldview that is itself built on empirical foundations (Saitta 1983, 303). Here the etic is a roar, the emic but a whisper, interpretations potentially speaking more of contemporary understandings of art than those in the Palaeolithic. There is a clear need to cast light on these assumptions, to reveal them as such, and explore alternatives to further understandings of Palaeolithic art.

3.4. Rendering Visible Aspects of Western Ontology: Humans, Animals, Things

Humans, non-human animals (henceforth animals following Birouste *et al* 2015) and things are central concepts in the exploration of any Palaeolithic art. An appreciation of the western understanding of these categories reveals something of the implicit baggage that can be carried over into Palaeolithic analysis and interpretation.

The western world has traditionally been portrayed as being composed of fixed and immutable categories, often in binary opposition (Casella and Fowler 2004, 7), such as human/non-human, alive/dead, subject/object. This yields an essentialist understanding of the world (Henare *et al* 2007, 2). The western conception of the human is construed as a self-made, bounded individual (Fowler 2004, 14) with roots in Judaeo-Christian religious thought and the separation of self into body and soul (Dumont 1996, 93; Hollis 1996, 217; Mauss 1996, 19; Murray 1993, 7; Whittaker 1992, 194). The mind is dualistically partitioned from the body (Descartes 2003 [1641]), with the former acting as the seat of the soul – the true essence of self - and the latter rendered a mere vessel. The true self is anchored to and contained by the biological form with little capacity to extend beyond it; an individual is closed off from the broader world, fixed and stable (De Craemer 1983, 20; Fowler 2004, 16; Gamble 2007, 124; Harter, 1999, 283; Hollan 1992, 284). The western individual, thus bounded, is conceived as complete from birth (La Fontaine 1996, 132) and resilient to significant change in life outside of predictable biological rhythms and personal experience. This conception is reinforced by a scaffolding of primarily biological, neurological and psychological knowledge of the human, such as genetics (Strathern 1995, 106), fusing the western conception of self - the individual - to scientific fact.

The classic western conception of things is influenced by an economic model of consumerism and capitalism, and by a cultural framework that is highly materialistic. In a western context, objects are broadly construed as empty, of the moment, and easily discarded alienable commodities (Hoskins 1998, 190-194; Weiner 1992), readily replaced after use to fill an empty self (Cushman 1990; Wagner 1995). Objects encountered in daily life can come to be understood as alienable: passive matter to be consumed and discarded once its purpose is served, typically barren of any deeper significance beyond that which humans attribute to it (Olsen 2007, 582; Weiner 1992). The vast array of objects created for every conceivable need stands as a testament to a perceived human domination of nature, bent in all its myriad forms to service the whims of humanity. Human mind is imposed on impressionable matter, with materials construed as raw, fixed, and pre-cultural, with known and exploitable chemical and physical properties malleable to human action (Conneller 2011, 1, 3). In the absence of making and exchange, relations are more commonly forged between individual consumers and business through cash as a means of brokering a complete transfer of ownership of things. The act of making is the imposing of preconceived form on raw, passive, inert matter (Ingold 2012, 432) and is typically separated from individuals, instead industrialised and automated. In this system of alienable exchange, there are no lasting ties or meaningful bonds beyond the legal framework of exchange. The separation from the means of production, the severing of human-material dialogue through making, has likely contributed to an impoverished view of the material world (Hoskins 1998, 194).

The traditional western attitude to animals is oriented around the concept of human exceptionalism (Hussain and Floss 2015b, 45). In the west, 'person' equates with 'human'. The mind is the defining attribute of humans, with the body an empty vessel (Descartes 2000 [1641]). Animals are bodily but fall short of personhood by virtue of being mindless, lacking language and the capacity to appreciate complex sensation (Hill 2011, 408; Overton 2014, 57). All species are measured in human terms against the yardstick of human achievement and evolutionary niche specialism. As no other species is as human as humans are, all other species immediately fall short of humanity regardless of the means of assessment and regardless of the outcome of those assessments. Any sense of agency or personhood is restricted in other animals by extension, rendered invisible by virtue of this human exceptionalism, understanding animals only in our own terms. The default relationship with animals in the west is one of dominance and coercion, with animals ultimately rendered a special type of resource, a passive entity used to serve human needs and whims, whether as food, beasts of burden or as pets to entertain and provide comfort (Haraway 2003).

Perhaps a good example of the impoverished attitude to animals in the western world, and one pertinent to attempts to build parallels in the Palaeolithic, is the changing attitudes to chimpanzees, bonobos and some capuchins in both wild and captive contexts. Once denied a broad range of capacities deemed uniquely human, there is now increasing evidence for: complex communication or language (e.g. Savage-Rumbaugh and Lewin 1994), culture (e.g. Boesch 2003; Boesch *et al* 1998; Whiten *et al* 2003), tool use (e.g. Boesch and Boesch 1990; Jalles-Filho *et al* 2001; Mercader *et al* 2007; Mercader *et al* 2002; Phillips 1998; Schick *et al* 1999), complex emotions (e.g. Boesch *et al* 2010; de Waal 2007, 2008; Spikins *et al* 2010), complex social lives (e.g. Dunbar 1993; 2010) and complex cognition as expressed through large brain size and neocortex ratio, along with advanced theory of mind capacity facilitating complex social interaction (e.g. Dunbar 2003a; 2007). There is growing support for the notion that these capacities existed in *pan* before contact with humans, with stone tools produced by chimpanzees found at the site of Noulo, Africa, dating to 4,300 years old, long predating any human scientific intervention or management (Mercader *et al* 2007). Correspondingly, the capacities of early hominins has shifted in the face of this evidence to create a linear model of evolution with chimpanzees and bonobos as an early diverging cousin and necessarily more simple than early hominins directly ancestral to humans.

Of course, the extent to which chimpanzees and/or bonobos are proximate to humans is to miss the point. The realisation of complexity shares many of the problems of the earlier interpretations of simplicity in that it is an inherently comparative approach, with the criteria for complexity still set in the frame of human achievements. The attributes of the animal should be understood in their own terms rather than solely in relation to humans. This example serves as a reminder that understandings in the modern deeply effect conceptions of the past, whether implicitly or explicitly. The incapacity to attribute complexity to primates, and the subsequent use of that simplistic rendering of extant primates as an analogy for the capacities of early hominins, played a critical shaping role in arguments of their limited capacities, manifesting as the second wave progress paradox, discussed in chapter 2. Understandings of self in the present demonstrably shapes research about the past. Alternatives are needed to encourage a critical discussion in how approaches to the past are formulated, rather than a reliance on an implicit and assumed western framework.

3.5. Exploring Non-Western Worldviews as an Alternative: Applying Anthropological Insights

Western humans do not always make particularly convincing westerners, if defined only in this traditional and rhetorical academic conception. Conformity to a sharp distinction between west and non-west is itself to conform to a western ontological system and the purity of categories. LiPuma (1998) has noted that aspects of western and non-western conceptions of the person can be found to varying degrees in different contexts in the west and non-west. There is growing scrutiny of this traditional take on the western human condition, with a sense that what has been taken as factual and grounded in science is at least to some extent rhetorical, not entirely matching how humans behave in the world on a daily basis (Battaglia 1995). The critique has been broad ranging, questioning, for example: the nature of human/animal relations (e.g. Haraway 2003); the importance material objects can play in our lives and the inalienable, emotional and mnemonic connections that can be forged with them (e.g. Hoskins 1998; Meskell 2005; Miller 2001; 2005a; 2005b; 2012a; 2012b; Weiner 1992); and the role of material culture in the formulation of self, the extending of self, and the questioning of a mind/body distinction through notions of cognitive extension or embodiment (Clark 1998a; 1998b; 1999a; 1999b; 2002; 2003; 2008; Clark and Chalmers 1998; Damasio 2000; 2006; Hutchins 1995). The recognition of the west as W.E.I.R.D. was itself a call to arms to explore a more diverse population in psychological and neurological testing, in recognition of the prominent bias in the use of western undergraduate students in at least 90% of studies conducted (Henrich *et al* 2010a, 89).

These studies and others like them serve as a reminder that the nature of humans, animals and things, and perhaps more importantly how they interrelate, is not fixed and known, a solved problem with a solidified solution. Instead, they are relational, constantly recast and in a perpetual state of becoming. Correspondingly, there is no reason to presume that a western ontological framework, perhaps only a few centuries old and with its roots in the Enlightenment, had any bearing on the human condition in the past any more than it can account for all the varied cultural experiences in the present, including within the western world.

The western W.E.I.R.D. worldview may well be the least well-suited group from which to build analogies or generalisations, being an unrepresentative and extreme outlier in most psychological studies in a broad raft of capacities (Henrich *et al* 2010a, 79). Anthropology can, through ethnography, be a way to explore archaeology with western biases exposed if not suspended, simultaneously offering myriad alternate contextual understandings of the world. The use of ethnography in archaeology has rightly been scrutinised (e.g. Wobst 1978). Anthropology has been a constant companion to Palaeolithic archaeology and its use is not new. Indeed, it shares much of its history with the origins of archaeology, emerging as a coherent discipline during the Enlightenment of the 18th century (Barnard 2014, 3). Ethnography and anthropology can be dangerous when misused, typical of its 19th century usage when it was employed to justify notions of the primitive and to promote the racial inferiority of the non-west, as touched upon in chapter 2 (Kelly 2013, 5). Through concepts of race, non-western and Palaeolithic groups were given direct equivalence, perhaps as much in aid of a Victorian colonial and imperial agenda as to understand the archaeological record. The connection between the Palaeolithic and anthropology was two-way and reinforcing and used as a means of legitimising the rejection of true artistic capacity, as defined in western art-historical terms.

There is clear danger in the casual, direct application of data derived from contemporary hunting and gathering groups to the Palaeolithic. The history of ethnography is a poignant reminder that hunting and gathering peoples are not data; they are vibrant modern cultures impacted by trade with agricultural neighbours, the encroachment of globalisation, and a history of colonial contact (Kelly 2013; Layton 2001). However, ethnography has an important role to play in contemporary explorations of the Palaeolithic and in exposing bias and assumption. Its significance can be felt both when trying to interpret the Palaeolithic record and acting as a check against western assumption and imposition in a contemporary research setting. With the conscious discarding of historical colonial baggage and the replacement of notions of race with those of culture through internal critique (Hamon 2016), ethnography can be a useful tool to inspire the archaeological imagination (González-Ruibal 2016). Patterns that occur in multiple groups are perhaps especially well-suited as a basis for analogy with the far distant past, creating a stronger analogical foundation (Van Reybrouck 2012, 31).

Archaeologically, the use of non-western anthropological insights to inform the Palaeolithic is justifiable on the grounds of a more proximate affinity of lifeway between contemporary hunting and gathering peoples and prehistoric hunter-gatherers than western culture. The comparison of hunting and gathering societies is still replete with assumption but is more resonant with ancient hunting and gathering lifeways than W.E.I.R.D. worldviews (Clottes 2013, 8). This is a more reasoned and transparent set of assumptions than the imposition, uncritically, of western norms and logic and offers greater potential for original insight in the Palaeolithic. An increasing awareness of the history of anthropology, expressed in recent work that challenges the definition of hunter-gatherers, as well as an awareness of contemporary trajectories of contact with outside influences (e.g. Barnard 2004a; 2004b; 2014; Jordan 2008; Kelly 2013; Lane 2014) provides a strong and critical foundation upon which more meaningful and appropriate analogies can be formed. The use of non-western insights here is in equal parts about expanding understanding of the Palaeolithic and making evident implicit western assumptions and biases in the analysis and interpretation of aspects of the Palaeolithic archaeological record.

3.6. Outlining Aspects of Non-Western Ontologies: Humans, Animals, and Things in an Animistic World

The western ontological understanding of humans, animals and things is by no means universal or dominant within the vast variance of world cultures. An animistic and relational ontological system is explored as a contrast to the western understanding of the world. The rich understanding of humans, animals and things, typical of animistic accounts is potentially significant in inspiring alternate approaches to Palaeolithic art. Animism here refers to 'new-animism', distinct from early modes of animistic thought imported into archaeology by Tyler in the 19th century and conceived as a universal primitive proto-religion (Willerslev 2013). Building insights from an animistic ontological foundation is appropriate for several reasons. A propensity to reconsider the relations between humans, animals and things in animistic accounts links well with a similar interplay in Palaeolithic art. Equally, these relationships are typically construed relationally, encouraging a close reading of each component, which marries with a contextual and biographical approach, considered in greater detail in the sections that follow. Perhaps more importantly still, it is a feature that is common amongst diverse hunting and gathering communities. This is evidenced in table 3.a., a synthesis of a recent anthropological encyclopedia (Lee and Daly 2006) selected at random. It serves well here due to its global coverage of ethnographically documented communities, reflecting a mix of immediate and delayed returns systems (Woodburn 1982) and degrees of mobility and sedentism, and it lacks an agenda to demonstrate the breadth of variations of animistic worldview. Of the 55 societies discussed, 38 displayed some elements of an animistic worldview. 1 case, that of the Blackfoot of North America, was excluded as no mention was made of religious belief (Kehoe 2006). An entire sample derived from Australia did not technically demonstrate an animistic worldview, but instead all broadly adhered to the totemic Dream Time, a system in which ancestors play a more central role (Beckett 2006; Dussart 2006; Goodale 2006; Keen 2006; Martin 2006; Morton 2006; Myers 2006; Smith 2006; Tonkinson 2006; Toussaint 2006). While this is strictly different from an animistic worldview, totemic attitudes to the world are similar, with the world beyond humans alive with meaning. These systems have been described as different orientations rather than strictly different ways of seeing the world (Bird-David 2006, 34). The remaining groups that did not display any animistic characteristics were largely from Africa (Biesele and Royal-/o/oo 2006; Hitchcock 2006; Kaare and Woodburn 2006; Kratz 2006; Tanaka and Sugawara 2006) and Southeast Asia (Endicott 2006; Song 2006). The specifics in each case are highly variable but the repeated casting of human engagements with aspects of the world in relational terms is a clearly repeating theme, providing a firmer footing for its exploration in an archaeological context to inspire new considerations.

Table 3.a.

Group	Location	Type	Summary Example	Reference
James Bay Cree	Quebec, Canada	Hunter-gatherers, now settled in villages	Consider animals to gift themselves to hunters, demanding appropriate treatment that allows the animal spirit to be reborn.	Feit 2006, 42
Slavey Dene	NW Canada	Hunter-gatherers, now settled in villages	Believe in animal spirit helpers in individual relationships with humans, linked to food restrictions for each person. These spirits are linked with the formation of notable landscape features in the world.	Asch and Smith 2006, 48-49.

Innu	Quebec and Labrador, Canada	Hunter-gatherers, now settled on reserves	Humans are equals with nature. Spirit masters control animals and commune with humans through dreams. Animals must be treated with respect to maintain the relationship.	Mailhot 2006, 53-54.
Caribou Inuit	Hudson Bay, Canada	Hunter-gatherers, now settled in hamlets at Nunavut	All things possess spirits, some manifest as animals and living organisms while others lack corporeality. These spirits could interfere in human life, such as bringing bad weather or causing accidents. The spirits were appeased through observing taboos, discovered by shamans.	Burch, Jr. and Csonka 2006, 59.
Inupiat	Alaska	Hunter-gatherers, now settled	Animals possess souls and give themselves to hunters. This demands appropriate treatment of animals by the human to appease the spirits.	Worl 2006, 63.
Timbisha Shoshone	Death Valley, California, USA	Hunter-gatherers, now settled in villages	All things have a spiritual essence, including animals, the weather, trees and rocks. Relationships are built on an individual basis with spirits who visit humans in dreams, encouraging proper treatment of other species.	Fowler 2006, 68-69.
Witsuwit'en	NW Canada	Hunter-gatherers, now living in settled communities	Believe in guardian spirits and drawing psychic power from the land. The universe is living, with distinct human and animal identities, mediated through dreams.	Daly 2006, 74.

Gitxsan	NW Canada	Hunter-gatherers, now living in settled communities	Believe in guardian spirits and drawing psychic power from the land. The universe is living, with distinct human and animal identities, mediated through dreams. More ceremonial and secular that Witsuwit'en belief.	Daly 2006, 74.
Aché	Paraguay	Hunter-gatherers	Believe in spirits which are variously responsible for harm and accidents, but also healing and dreams, as well as giving some animals their properties and power.	Hill and Hurtado 2006, 94-95.
Cuiva	Colombia and Venezuela	Hunter-gatherers	There is a strong sense of reincarnation amongst humans, with new births reflecting the return of old souls. There is a parallel process in animals and plants, with each perpetually returning to the earth.	Arcand 2006, 99.
Huaorani	Amazon, Ecuador	Hunter-gatherers	Shamans, through the help adopted jaguar sons are used to mediate relationships with game animals and keep them close.	Rival 2006, 103
Sirionó	Llonos de Mojos, Bolivia	Mobile horti-culturalists, settled in missions by the 1930s	Mounds in the forest are thought to be a place where the spirits of deceased headmen reside. There is some modest belief in spirits beyond humans that can influence human affairs.	Balée 2006, 108.
Nachila-molek Toba	Gran Chaco, Argentina	Farming, now settled in villages	"the bush" is inhabited by spirits which protect animals relied upon by the Toba and provide	Gordillo 2006, 112.

			shamans with the source of their power to be able to heal.	
Yamana	Tierra del Fuego, Argentina	Hunter-gatherers, now almost completely destroyed	Society has both male and female shamans. Amongst their powers is the capacity to commune with animals. They have been known to call animals such as whales to the Yamana.	Vidal 2006, 117.
Ainu	Hokkaido, Japan	Sedentary hunter-gatherers, now considered 'post-forager'	Practices an animistic belief system, tightly interwoven with ceremonies conducted by shamans. Objects used in rituals to commune with spirits can come to be understood as being potent, possessing spiritual energy. The bear ceremony sees a bear ritually killed to act as a messenger to the spirits.	Svensson 2006, 235.
Siberian Yupik	Chukchi Peninsula, Russia	Hunter-gatherers, living in villages	The environment is considered animate, populated by non-human agents capable of speech. Animals possess souls along with humans, and spirit masters control aspects of the environment, such as plants and rivers. These spirit masters must be engaged with for humans to be successful. Prominent rituals surround whales to ensure they were guided back to their home country at death.	Schweitzer 2006, 139-140.
Chukchi	Chukchi Peninsula, Russia	Hunter-gatherers, living in	The environment is considered animate, populated by non-human agents capable of	Schweitzer 2006, 139-140.

		villages	speech. Animals possess souls along with humans, and spirit masters control aspects of the environment, such as plants and rivers. These spirit masters must be engaged with for humans to be successful. Prominent rituals surround whales to ensure they were guided back to their home country at death.	
Evenki	Lower Enisei valley, Russia	Hunter-gatherers, now settled in villages	The concept of shaman – intimately bound to an animistic worldview - originated with the Evenki. The world is sentient and dreams can be a window into game movements. In return, humans make offerings to this sentient world of fat or coins.	Anderson 2006, 145-146.
Itenm'i	Kamchatka, Russia	Hunter-gathers, living in seasonal villages	Believe in a world filled with spirits, including the spirit of the sea and the master of animals. These spirits are typically honoured after a successful hunt. Shamans are in evidence, used to cure bad luck or illness and talismans are worn to ward against malevolent forces.	Shnirelman 2006, 150.
Iukagir	Iakutiia, Russia	Hunter-gatherers, seasonally semi-sedentary	Believe in a tripartite universe with humans and animals and their spirit owners occupying the middle world. The spirit masters are linked to animals, fire, rivers and other aspects of	Ivanov 2006, 154.

			the world. Shamans receive their power from such spirits.	
Ket (Ostyk)	Enisei valley, Russia	Hunter-gatherers, sedentary	Spirits occupy the world and each plays a different role. The master of the forest animals controls success in the hunt. That support is contingent on rituals of renewal to ensure the regeneration of exploited species. Shamans were active in the community, involved in care of the unwell.	Alekseenko 2006, 159-160.
Khanti	Western Siberia, Russia	Hunter-gatherers, semi-sedentary, moving with the seasons	Nature was understood as animate. Animals possessed souls and certain species and objects were thought to possess supernatural abilities. Rituals of respect were conducted for some animal species.	Nemysova 2006, 163-164.
Nia (Ngana-san)	Taimyr peninsula, Russia	Hunter-gatherers, now nomadic reindeer herders	The world was mediated by spirits and shamans used spirit helpers during rites to appeal to the spirits for the well-being of the people.	Golovnev 2006, 168.
Nivkh	Sakhalin island, Russia	Hunter-gatherers, semi-sedentary	Natural features, such as mountains or the sea, have spirit masters that are placated through feeding rituals. Offerings of food or vodka are left at the foot of trees before entering into the forest.	Grant 2006, 172.
Aka	Oubangi and Sangha	Hunter-gatherers	The forest is the world of spirits. Ceremonies, often involving	Bahuchet 2006, 193.

	rivers, Republic of Central Africa and Congo		singing and dancing are performed to placate spirits, before the hunt and after the hunt, especially the hunting of elephants with assegais.	
Mbuti	Ituri forest, Congo	Hunter-gatherers, semi-sedentary	The forest is thought to be a provider, presided over by the father of the forest. In times of scarcity, the forest father is thought to close the forest. Singing and dancing rituals are performed to the father of the forest to open the forest once more.	Ichikawa 2006, 212-213.
Mikea	Mikea forest, Mada-gascar	Recent hunter-gatherers, mixed semi-sedentary and mobile strategy	The forest is filled with spirits, oversaw by a spirit master of the forest. Spirits manifest in specific sacred spots within the forest. Rituals are performed to ensure success in the hunt or collecting rare resources. Oracles are used to divine the right time for the group to move into the forest, implying engagement with the spirits.	Kelly and Poyer 2006, 218.
Andaman islanders	Andaman Islands, Bay of Bengal	Hunter-gatherers, semi-sedentary with seasonal movement	The world is alive with spirits, linked to natural features such as earthquakes, thunder or rainbows, but emphasising movement. Spirit mediums can commune with spirits through dreams. The dead, dependent on the manner of their death and treatment, can return as	Pandya 2006, 245-246.

			benevolent or malevolent spirits.	
Birhor	Eastern and central India	Hunter-gatherers	The universe is formed of humans, nature and supernature that together form a moral community. Natural phenomena are understood as animate, linked to spirits. The human dead can be inducted into the spirit world.	Adhikary 2006, 250.
Chenchu	Deccan, Adhra Pradesh, India	Hunter-gatherers, with some wage labour	There is no sharp distinction between the human and animal worlds. The activities of wild animals is overseen by a specific deity, linked with success in the hunt.	Turin 2006, 254-255.
Nayaka	Wynaad, southern India	Hunter-gatherers, largely sedentary	Each locale occupied by humans and non-humans, including spirits. Spirit possessions are held during rituals, with the spirits being fed in exchange for protection from illness or cures.	Bird-David 2006, 259-260.
Paliyan	Western Ghats mountains, India	Hunter-gatherers, semi-nomadic	Spirits are responsible for protection, or the management of game. For these services, rituals are held with food offered in thanks to the spirits.	Gardner 2006, 263-264.
Hill Panda-ram	Kerala, Western Ghats mountains, India	Hunter-gatherers, mobile	Hills and mountains are understood to be spirits. Different types of spirit might be contacted during times of poor hunting success or illness. Possession rights are practiced, but spirits can also be contacted	Morris 2006, 267-268.

			through meditation, or offerings of food.	
Wanni-yala-aetto / Veddahs	Sri Lanka	Agriculture, supplemented with hunting and gathering	Everything is alive. Animals are conscious agents. The world is filled with spirits that inhabit rocks, tress and other natural features. Disgruntled spirits may send animals to trample gardens, necessitating rituals and the giving of food to appease the disgruntled spirit.	Stegeborn 2006, 271-272.
Agta	Eastern Luzon, phillipines	Hunter-gatherers, but with occasional agriculture	Spirit forces inhabit the natural world. These can variously be benevolent or malevolent, helping in the hunt or posing risk of death.	Griffin and Griffin 2006, 292.
Batak	Palawan island, Phillipines	Hunter-gatherers	Malevolent and benevolent Spirits are visible only to shamans, inhabit trees, rocks and other natural features. They act in a caretaker role in relation to resources and will punish wastefulness. Trance dances are used to mediate with the spirits.	Eder 2006, 296.
Jahai	Northern peninsular Malaysi	Mixed: hunting and gathering, trading, agriculture	Shamans use spirit guides to mediate with the spirit world. The tiger is particularly strong as a spirit guide. Spirits can be both benevolent and malevolent. The shaman is selected for the position by the spirit guides.	Van der Sluys 2006, 310.
Western Penan	Borneo	Hunter-gatherers, but	Souls and spirits occupy the world. Animals possess spirits which can report transgressions	Brosius 2006, 315.

		increasingly agriculture	by humans to the thunder god who punishes humans.	

Table 3.a. showing the results of an analysis of an ethnographic encyclopedia (Lee and Daly 2006) to identify traces of animism. The data suggests that animistic ontology is diverse, varying by specific culture and context, but is found as a repeating theme across the globe in hunting and gathering cultures in diverse circumstances.

The non-western person is often understood to be deeply connected to others, with one's relationship to others a contingent part of one's self-concept. The individual as conceived in a western worldview is not recognised; people are permeable and partible, a concept originating from Melanesian ethnography, termed 'dividuality' or fractal personhood (Strathern 1990; 1998; Wagner 1998). The non-western 'dividual' espouses a relational understanding of the person in which the relationships that bind people together are critical and typically materially mediated (e.g. Bamford 1998; Battaglia 1983; Busby 1997; Harrison 1993; Mosko 2000; Rumsey 2000; Strathern 1990; Wagner 1998; Weiner 1987; 1992). A relationally constituted person is understood as constantly becoming through their relationships with others, unchained from the biological and physical form, the edges of one person blurring with others in the community (Kirk 2006, 335; Hollan 1992, 284; Markus and Kitayama 1991, 227; Snyder 2002, 156). Personhood is a constant state of becoming, the person changing with those people around them and never being complete (Brück 2001, 655; Kirk 2006, 334; Rival 2005, 288; Viveiros de Castro 1998, 480).

The role of things and animals in an animistic worldview are similarly distinct when compared to the western conception. The status of person and agency are rarely restricted to humans alone and can be extended into aspects of the world. Animals and things can be construed as agents in their own right, and often with a less rigid separation between these categories (Hill 2011, 408). The interactions between these entities are understood as mutually constituting, much in the same way as human-human relationships (Hill 2011, 409). Human agency is not construed as primary in all circumstances and the role of animals and things in human/non-human interactions is considered active and mutual. Jordan's description of hunting amongst the Siberian Khanty serves as a good example of how animals can be construed as active agents within human/non-human interactions. Jordan (2003b) describes the relationship of humans hunting elk as one of the animal gifting itself to the hunter. The success of the hunt rests as much on animal co-operation, the animal giving itself to the hunter, as on the skill of the hunter. In return for this co-operation, there is a need for the hunter to treat the animal carcass with the necessary respect to ensure this relationship continues in the future and the soul of the animal can be recycled:

"…successful hunting of elk, on Khanty conceptions, is as much about the inclination of the animal as the skill of the hunter. The elk is thought to give itself up to the hunter as an act of personal choice…" Jordan (2003b, 106).

This particular notion of non-human gifting to humans is common within an animistic ontology (e.g. Jordan 2003b, Bird-David 1990, Willerslev 2004, 2007) and perhaps parallels gift giving in human/human exchange systems. A sense of agency can come to be appreciated in non-humans and how a rapport is built with non-humans through mutual negotiation of the relationship, leading to mutual constitution of those agents in the relationship. Whitridge (2013) takes up this theme of mutual negotiation when he notes that humans often utilise animal trails to negotiate the landscape. The re-use of tracks over generations by both humans and animals emphasises a cumulative and multiple-authorship of the trail and correspondingly of the landscape that all species share.

This understanding of the world is not limited to animals, but also attributes of the environment. In discussing the Nayaka of the Wynaad, southern India, Bird-David (1990; 2006) notes the agentic qualities of the forest in which the Nayaka live and rely on for their way of life, being construed as a benevolent provider alive with spirits inhabiting, in a western worldview, seemingly inanimate matter:

"…the forest…is not something "out there" that responds mechanically or passively but like a parent; it provides food unconditionally to its children. Nayaka refer, for example, to the spirits that inhabit the hills, rivers, and rocks in the forest and to the spirits of their immediate forefathers alike as *dod appa* ("big father") and *dod awa* ("big mother")…They believe that *dod appa* and *dod awa* look after them and provide for their needs." (Bird-David 1990, 190).

This way of understanding the world extends into the material world where objects can be rich in significance and materials alive with meaningful properties. Materials can be active in the process of production, shaping the finished form and influencing choices about how materials are used. This is likely influenced by the close connection between humans and the means of production for most of the things needed in daily life. Norris (2004) highlights some of these themes in a discussion of Indian clothing, understood to be intimately connected to its wearer with no clear separation between one and the other (Norris 2004, 62). As items of clothing are shared, the genealogy of the garment grows as it transmits human essence from person to person but also acquires new essence from new recipients of the garment (Norris 2004, 62). The clothing acts as a mediator in a network of relations between givers and recipients that bind them together and alter the very nature of the persons in the exchange relationship, as well as the garment itself (Norris 2004, 63). Each person is changed by the giving and by the receiving, each becoming bound to the others through the path of the object, much as the object changes and grows in the giving (Norris 2004, 62). In such a conception, deconstruction can come to be understood as construction. Old items of clothing that have degraded beyond use are often cut up and incorporated into new garments for children (Norris 2004, 63). Though this garment is new, it is treated as possessing a long genealogy based upon the fragments of the objects that in part make it up (Norris 2004, 63), each scrap of fabric a daughter fragment of the parent object (Chapman and Gaydarska 2007). In this way, the original fragmented garment, and the associated essences and meanings, continue to circulate and to grow, even though they are part of a new object (Norris 2004, 63).

This brief review of an animistic and relational worldview serves to place the western worldview in context, as one way of understanding the world amongst many. It is a position adopted inherently by modern western researchers, which has a shaping influence on how Palaeolithic material culture is approached and understood. In the case of Palaeolithic art, this has led to a clear orthodoxy in how art should be approached and how it should be interpreted. A relational approach inspired by animistic ontology offers an opportunity to reconsider the routeway of how art is approached and interpreted and in a way which is likely more resonant with Palaeolithic populations, which were themselves far from W.E.I.R.D.

3.7. Towards a Relational Archaeology of Palaeolithic Art: Materiality and the Biographical Approach

Diverse relational approaches are not without precedent in prehistoric archaeology. Important advances have been made variously in Iron Age archaeology (e.g. Argent 2010; 2013), Bronze Age archaeology (e.g. Brück 2004a, 2004b, 2006; Fowler 2004b; Janik 2007), Neolithic archaeology (e.g. Brück 2001; Fowler 2001, 2004b; Harris 2013; Hofmann 2013; Kirk 2006; Losey *et al* 2010; Losey *et al* 2013; Orton 2010; 2012), Mesolithic archaeology (e.g. Conneller 2004; Fowler 2004; Herva and Ikäheimo 2002; Overton 2014, 2016; Overton and Hamilakis 2013), and increasingly Palaeolithic archaeology, both relational approaches (e.g. Birouste *et al* 2015; Conneller 2011; Farbstein 2011a; 2011b; 2013a; 2013b; Fuentes 2016; Hussain and Floss 2015a; 2015b; Jones 2014; Needham 2010; Piprani 2011; Porr 2010; 2015; Porr and Bell 2012; Porr and de Maria 2015; Tosello 2003; White 1992; 2003) and models of cognitive extension (e.g. Knappett 2002, 2004, 2006; Malafouris 2004, 2008a, 2008b, 2010). There are also works that are not period specific but contribute to achieving the same ends by advancing theories modified from other disciplines for archaeological use at a grander scale (e.g. Hodder 2011, 2012, 2014; Ingold 2000; 2006; 2012; Latour 1993; Shanks 2007; Webmoor 2007). While these works are important and act as a point of inspiration in approaching the art of Montastruc, none of them can necessarily be assumed to carry explanatory value in differing contexts, each relational approach being somewhat tailored and unique to the specific context it addresses; there is a necessary diversity nested within the similarity of these approaches.

The approach to art espoused here is inspired by existing prehistoric relational archaeologies. The formulation of a specific approach for Palaeolithic art starts from a different field of assumptions from those models considered in chapter 2, key amongst which is that non-western ontologies need to be taken seriously (Nadasdy 2007; Porr and Bell 2012) and used as a starting point to inspire a model which resonates with contemporary hunter-gatherers. There is a need to bring into question Cartesian divisions such as animal/human or object/subject that have largely been taken for granted as self-evident universals (Dowson 2009, 379). Models must move beyond such a 'tyranny of the obvious' in which categories are thought so obvious as to be overlooked entirely (Dobres 2000, 71). Localism and contextualism in interpretation and understanding are needed, rather than more universal models that try to explain art in all its myriad spatio-temporal manifestations (Dowson 2009, 385). Art can be understood in a nuanced way, as more than the finished product, more than the visual component, as it might be construed in a western setting. Instead, as much attention might be given to production, the materials used, the use of the art and its eventual 'destruction' or 'decommissioning', and that these engagements were likely multi-sensory (Díaz-Andreu *et al* 2014; Pettitt *et al* 2014; Rifkin 2009; Till 2014; Waller 1993a; 1993b).

The exploration of the *object biography* of art, how the object mediates social relations, changes, develops and transforms meaning (Gosden and Marshall 1999; Kopytoff 1986), is one such way to explore the broader significance of the art beyond the visual and the finished form in what is here termed *decentring* (Finlay 2014). This approach has grown in popularity across anthropology, history, art history and archaeology since its formation in the 1980s (Hoskins 2009, 78). In discussing the chaîne opératoire, a component part of the life history of a thing, Dobres (2000) has noted that technical gestures, the making, using and depositing of technology, is inherently social, with no demarcation between social gesture and 'functional' aspects of production. This is significant, as it would suggest that specific elements of the Palaeolithic worldview, played out through the social engagement of making and using material culture, is preserved in the material itself. This challenges models such as those of Hawkes (1954), which would consider the social and the cosmological to be nearly impossible to study, instead collapsing the division between functional and social or cosmological and rightly re-inserting the social into every decision, choice, action and gesture. However, Dobres' (2000) approach is limited in its consideration of material, with primacy given to human action within material engagements, in opposition to insights derived from the exploration of a relational and animistic ontological system. Here Conneller's (2004, 2011) work on *materiality* is significant, highlighting connection and the flow between the categories of human, animal and thing in Mesolithic and Palaeolithic Europe. Conneller (2011) notes the active nature of materials within chains of production, with animals and things construed as agentic, and that social gestures can be linked to specific properties within material. This approach provides a greater equality between agentic categories, exploring animal/human/thing biographies and how they interact through the production of things. Conneller (2011) goes further and explores how the thing comes to be meaningful by virtue of the active nature of the components that have been brought together in its production. The following of a broadly animistic relational ontology in which humans, animals and things can be considered active, implicated in the production of one another, and active in the creation of material culture, further complements the approach. This was explored in Conneller's (2004) work on antler frontlets from Star Carr, where the flow of essence between deer and deer products remained active in the production of frontlets that were worn by humans, creating a hybrid 'animal-object'.

An animistic relational ontology is especially useful in a complex phenomenon like art, providing an alternate framework to the shamanistic approach that has become common in art study (Dowson 2009, 379-380). Accounts from the ethnographic literature detailing art production within an animistic framework prove to be a rich source of inspiration for how art can be considered anew. For example, Bell reports a conversation with Mowaljarlai, a member of the Ngarinyin Australian Aborigines of the Kimberley, NW Australia, about the authorship of a piece of art:

"I ask Mowaljarlai how the paintings got there originally. 'we don't make that image … 'e paint himself. 'E tell us and we listen. That man who listening, 'e prepare himself- quiet time, no hot food, he listening. 'E putting that ochre when 'e listening. We not responsible for that image. Wanjina become a painting.'" (Porr and Bell 2012, 198).

Here the human painter is rendered relatively passive compared to the rock and Wanjina, a spirit ancestor, who painted himself onto the rock. The role of the painter was to listen, not to impose a form onto the rock. This same sentiment is expressed in a radically different context on the other side of the world amongst the Aivilik, an Inuit community living in Nunavut, Hudson Bay, Canada, in the making of pieces of art from walrus ivory, listening to the material to release the form already present inside:

"As the carver holds the unworked ivory lightly in his hand, turning it this way and that, he whispers, "Who are you? Who hides here? And then, "Ah, Seal!" He rarely sets out, at least consciously, to carve, say, a seal, but picks up the ivory, examines it to find its hidden form and, if that's not immediately apparent, carves aimlessly until he sees it, humming or chanting as he works. Then he brings it out: Seal, hidden emerges. It was already there: he didn't create it; he released it; he helped it step forth…*The carver is indifferent to the demands of the optical eye;* he lets each piece fill its own space, create its own world, without reference to background or anything external to it. Each carving lives in spatial independence. Size and shape, proportions and selection, these are set by the object itself, not forced from without. Like sound, each carving creates its own space, its own identity; it imposes its own assumptions" (Carpenter 1973, 21 quoted in White 2003, 27, my emphasis).

In a hunting and gathering context, Ross (2001) reports that rock art reflects a deep ecological and environmental knowledge possessed by its makers and plays a role in the socialising of landscapes and specific places (Ross 2001, 545-546). It can often feature at dramatic and significant landscapes locales, often becoming a fundamental component of the landscape in its own right (Ross 2001, 547). The surface of the rock is active in art production rather than a passive medium upon which the art is imposed (Conkey 2010, 280; Robert 2016; Ross 2001, 546). With animal/object categories subverted, the rock is understood as a 'portal' or 'semi-permeable membrane', with animals already present in the rock, the act of painting/drawing releasing what is hinted at in features of the natural morphology of the rock (Clottes 2013; Ross 2001, 546). An animistic and relational approach, inspired by ethnography, supported by an object biography framework infused with the deep interest in materials that stems from materiality, invites rich reinterpretation of every component of the art, its making, its use, and its destruction, each gesture understood as deeply social and potentially significant.

In a non-western animistic and relational world, art is *more than meets the eye.* In pursuing such an approach in the Palaeolithic, context takes on a new importance (Ross 2001, 554). Style and the visual aesthetic are no longer central attributes that can be analysed insulated from other attributes of the art. Instead, how art was made, used and deposited, the full life history, and how that life history varies from other bodies of objects, becomes a central avenue to understanding the art (Dobres 2000, 193). In so doing, so much more of the archaeological record than the art itself becomes directly relevant as the art meanders through its life, touching other aspects of the material record as it goes (Dobres 2000, 193). These interconnections between different domains of activity and how they interact within a context offer an important routeway to understanding the specific pattern of art production from a site within its specific context. A central concern, therefore, is context building and the creation of *contextual frames* around art objects based on the site context. So much of Palaeolithic art is technically unstratified by virtue of being placed on cave walls, separated from the broader record on the cave floor, or due to 19th and early 20th century excavation and recording practice. As a result, any attempt to study and interpret Palaeolithic art must be fundamentally realistic in trying to build a sense of such context: rarely will it be possible to reconstruct context completely. However, a methodological and theoretical framework that can encourage advancement in recontextualisation wherever possible, and to whatever extent might be possible, is significant in Palaeolithic art generally, and centrally so when pursuing an object biography approach.

3.7.1. Relational Object Biography meets Non-Destructive Techniques

Using a contextual approach and object biography, the need for rigorous techniques that can interrogate each phase of the life history of art is critical, and perhaps even greater than an approach that fixates on the finished form only (Dobres 2000, 102). Object biography is truly theory *and* method, merging techniques with research questions geared at particular stages of the life history (Dobres 2000, 156). Jones (2004a; 2005) has similarly described materiality as a means of bringing together theory and science, a sentiment that has received support in critical replies (Bray and Pollard 2005; Boivin 2005; Gosden 2005; Mithen 2005; Thomas 2005). This resonates with the bringing together of non-western ontology with western empirical techniques; the division is more apparent than real, derived from an overly rigid reading of a traditional, essentialising western ontology that imposes strict categorical differences. There is no reason to respect this distinction in the technical any more than in the theoretical and there is no reason to presume any incompatibility between these domains.

Art objects will always be difficult to access, whether by virtue of being attached to a cave wall, positioned in an intentionally remote place and in near darkness, or due to the necessary restraints on handling, transport and the techniques that can be used on long-term curated collections in museums, what can variously and collectively be termed the *research context*. A new corpus of digital and high-resolution, non-destructive techniques are a critical component to the approach and facilitate the surmounting of many of these challenges. By virtue of the significant increase in personal computing power in recent years, a wide range of techniques has correspondingly become viable in broader usage and in diverse contexts. This has been most marked in the 21st century where a vibrant literature has emerged detailing the varied archaeological applications of an increasingly diverse array of techniques. Taken collectively, this near revolution in the use of such methods represents a significant advancement in facilitating an object biography of art.

In recent years, advances have been made in assessing pigments, residues and object composition, most notably through the use of portable X-ray diffraction (pXRD) and portable X-ray fluorescence (pXRF) (e.g. Bardelli *et al* 2011; Ceteno *et al* 2010; Frahm and

Doonan 2013; Vellikey 2013), and raman spectroscopy (e.g. Ceteno *et al* 2010; Lahlil *et al* 2012; Mantler and Schreiner 2000; Milner *et al* 2016; Smith *et al* 1999; Smith and Clark 2004; Van der Weerd *et al* 2004). The use of a diverse range of digital methods have become popular in a wide range of contexts for recording, analysing and curating art in archaeology, central amongst them being various forms of 3D modeling (e.g. Alsadik *et al* 2015; Barber *et al* 2014; Bruno *et al* 2010; Domingo *et al* 2013; Gonzalez-Aguilera *et al* 2009; García Moreno and Garate 2015; González-Aguilera *et al* 2010; Grosman *et al* 2008; Gruusenmeyer *et al* 2012; Gruusenmeyer *et al* 2010; Güth 2012; Julien *et al* 2010; Lerma *et al* 2006; Lerma *et al* 2010; McPherron *et al* 2009; Niven *et al* 2009; Plisson and Zotkina 2015; Slizewski and Semal 2009; Slizewski *et al* 2010; Simpson *et al* 2004; Taylor *et al* 2002), highlight-reflectance transformation imaging (H-RTI) (Earl *et al* 2011; Malzbender *et al* 2004; Malzbender *et al* 2006) and digital imaging (Clogg and Díaz-Andreu 2000; Defrasne 2014; Duffy *et al* 2011; Earl *et al* 2010; Mudge *et al* 2006; Mudge *et al* 2010; Oestmo 2013; Rabinowitz *et al* 2009). This has been accompanied by a range of high-resolution imaging techniques that focus on working at magnification with art pieces, such as micro computed tomography (micro CT) (e.g. Bello *et al* 2013), scanning electron microscopy (SEM) (e.g. Alvarez *et al* 2001; Fritz 1999) and light microscopy of varying kinds (e.g. Cook 2010; Fritz 1999; Fritz and Tosello 2007; Marshack 1972). Such applications are often at their best when accompanied by actualistic experimental replication of the art under investigation. Experimental replication is an important tool in exploring the potential causes of specific patterns encountered on archaeological specimens. Good examples include work on red ochre use in the Middle Stone Age of South Africa (e.g. Hodgskiss 2010; Rifkin 2011, 2012; Rifkin *et al* 2015; Wadley 2005, 2010), or reconstructing how beads were made, worn and for how long (e.g. Needham *et al* in review; Vanhaeren *et al* 2013). These methods can be used in combination to develop a comprehensive sense of how an object was made and used through its life history. A recent example by Milner *et al* (2016) combined h-rti, structured light 3D scanning, residue analysis, experimental replication, SEM, pXRF and light microscopy to develop an object biography of the production, use and deposition of an engraved pendant from the Mesolithic site of Star Carr, UK. The level of specific knowledge generated by such an exhaustive approach is ideally suited to the use of a relational approach inspired by animistic ontology, where the understanding of how choices in production and use were negotiated can inform significantly on the biography of the object in question and the significance of that biography. Taken together, these techniques are a critical advancement in exploring relational archaeologies through object biographies.

3.8. Translating the Approach into Application: Engraved Plaquettes from the Magdalenian Site of Montastruc, France

The British Museum holdings from Montastruc, a Magdalenian rockshelter site in south-central France (chapter 5) acts as an extended case study for the application of this approach. It is a curated collection in the UK, offering the opportunity for the protracted study necessitated by an object biography approach. The collection is composed not only of art but also stone tools and other organic objects. These objects were also analysed to aid in interpreting the site. A summary catalogue produced by Sieveking (1987a) detailing all of the stone and organic art from the site acts as an important point of departure in approaching this collection. Similarly, recent work by Farbstein (2013b) and Cook (2010; 2012) has already begun the process of exploring the collection anew and in greater detail. In the former case, chaîne opératoire as social gesture was used to explore organic objects (Farbstein 2013b). In the latter case, light microscopy was used to create detailed interpretations of working techniques of naturalistic animal forms, compared to the behaviour of real animals of the same species (Cook 2010). A focus on the stone plaquettes from Montastruc is a needed accompaniment to these pre-existing studies that have only explored elements of the organic art assemblage.

3.8.1. Outlining a Framework for Analysis of the Montastruc Collection

To move beyond the limits of previous interpretative frameworks, and to embrace the approach outlined above, emphasis must shift towards the reconstruction of context, to explore the object biography of the art, the process of production and choices made through chaîne opératoire, and its subsequent life history. Fundamentally, such an approach is achieved through a deep reading and analysis of each object within an assemblage, with targeted methods used to analyse the specific attributes encountered. The techniques selected in this specific application were chosen in light of limitations in the potential to study the plaquettes based on their historical and research contexts: how they were excavated and historically curated and their current conditions of curation, with associated restrictions to access, handing and analysis.

The organic and inorganic art assemblage from Montastruc consists of 110 ‘functional’ and ‘non-functional’ organic pieces, and 53 limestone plaquettes. The collection is stored in Franks House, The British Museum, in temperature and humidity controlled stores. Necessary restrictions were in place in studying the collection, for both practical and curatorial reasons. They are briefly reviewed, as they are significant in the rationale for the techniques that were selected to study the collection. All art objects from Montastruc were subject to handling restrictions, so only a single surface was visible during analysis at a given time. This limited engagement in some ways, most notably the tactile. This can impact upon the impression and interpretation of an object, especially if an art depiction ranges over several surfaces. This increased the challenge of analysis and interpretation and posed restrictions on the types of techniques that could be employed. The objects could not be moved far from their temperature and humidity controlled conditions for protracted periods. Correspondingly, analysis was limited to work that could be completed in the study room of Franks House. The removal of materials from the museum was not possible for this research, limiting the range of techniques that could be employed if the technology in question was not itself mobile. Any technology or technique that could not be operated *in situ* at Franks House could not be used, significantly shaping the selection of methods to be employed.

The methodology employed in the project consisted of three non-sequential, iterative parts. Part one entailed a general exploration of accessible and appropriate methods, developing a sense of strengths and weaknesses through application to appropriate archaeological object sets. This testing was used to source and explore techniques that would best fit the research and archaeological context of the Montastruc plaquettes, a series of finely engraved, heavily weathered and delicate limestone blocks, with corresponding limitations on their transportation, handling and exposure to extremes of ambient thermal and moisture deviations from their regulated storage conditions. Part two was more directly centred on in-situ engagement with the collection itself, working remotely at the British Museum. In the first instance, this entailed the repetition and subsequent expansion of Sieveking’s (1987a) macroscopic analysis of all art objects from Montastruc held in the British Museum. Greatest emphasis lay with the plaquettes and decorated organics. However, it went further and assessed all ‘functional’ organic pieces, fauna, stone tools and other miscellaneous objects such as later intrusive pottery and unworked stones from the site, none of which have been published before. This facilitated the reconstruction of some aspects of context and activity at the site, allowing for the creation of an object biography. A detailed breakdown of all categories is presented in chapter 5. Part two was also an opportunity to identify patterns in the material that required further analysis with specific, targeted methods, and confirm the existence of patterns highlighted by Sieveking. Part three used specific methods explored in part one to explore patterns identified in part two, presented in the chapters that follow. A detailed summary of parts one to three is presented below.

3.8.1.1. Part One: Assessing Techniques

Part one consisted of a more abstract exploration of suitable methods for aspects of art analysis, explored through application to archaeological beads, pendants and colourants, the results of which are published elsewhere (Milner *et al* 2016; Needham *et al* forthcoming; Needham *et al* in prep). Relevant techniques explored included: 3D modeling, SEM, high powered light microscopy, low powered light stereoscopic microscopy with image-capture attachment, portable low powered digital microscopy, experimental actualistic replication, pXRF, h-RTI, and macro photography. The use of a wide range of methods to analyse a diverse range of art objects allowed for a critical appreciation of the strengths and weaknesses of the methods listed and which might be appropriate for the collection from Montastruc housed in the British Museum. Through this body of work, it became evident, especially given the varying limitations imposed by the research context encountered, that it is of little use to consider techniques as strictly inferior or superior to other methods. Rather, it is preferable to consider the range of methods available and how they might be best suited to a particular research context. There is a distinction between the best technique and the best technique for a particular context and selection was shaped by the latter consideration.

3.8.1.2. Part Two: Macroscopic Re-Analysis and Analysis of New Objects

Montastruc and its art assemblage have received previous analysis and interpretation in the form of catalogue summaries (Sieveking 1987a, 63-96). An initial analysis of the art from Montastruc was carried out, with results subsequently compared against those published by Sieveking (1987a). This direct macroscopic analysis of the plaquettes was used to formulate further targeted research questions, linked to original observations made during the analysis. The primary point of focus in this research was the inorganic assemblage, the engraved stone plaquettes, with organic art objects being subsidiary and used as a point of comparison. Correspondingly, analysis was only advanced beyond the initial macroscopic stage for the stone plaquettes. All objects from Montastruc encountered in the British Museum were subject to macroscopic analysis to facilitate the reconstruction of site context. A comprehensive analysis of the full assemblage was beyond the scope of the PhD. Analysis was limited to counts by tool type in the case of stone tools and organic debitage and a brief description of each object encountered in other categories.

The plaquettes and organic art objects were initially analysed macroscopically via cold light sources with swan-neck connections, used to create raking, oblique light sources to aid in the recognition and interpretation of anthropogenic engraving (fig. 3.1.). A hand lens (x6) was used to pick apart these arrangements of lines and assess specific details in the first instance, and to resolve features that were ambiguous to the naked eye. Working shots of each surface of each plaquette was photographed using a Panasonic DMC–FZ35 camera.

Figure 3.1.

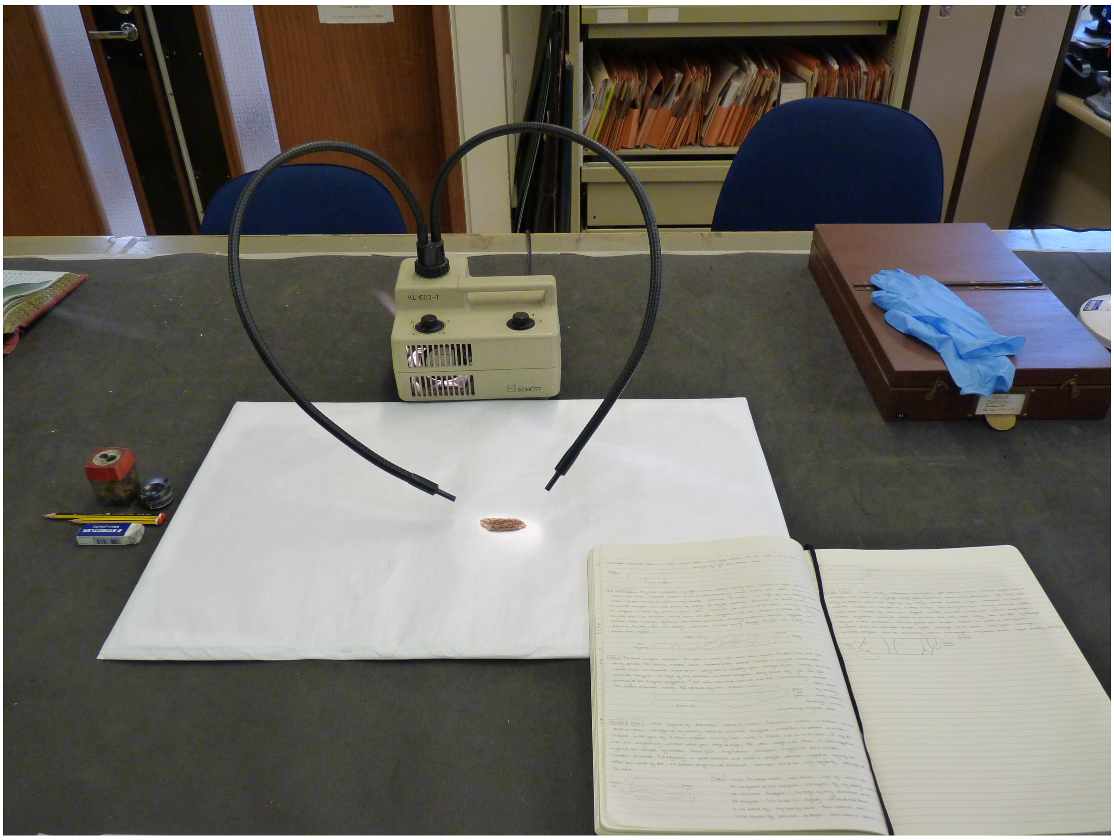

Figure 3.1. showing the set up of macroscopic kit use in analysing the art from Montastruc. Cold light sources were used to illuminate the object a hand lens was used to make observations, and these were recorded with a digital camera and with supporting notes. Image: author.

Images were also captured using a Nikon d5500 camera with AF-S VR MICRO-NIKOR 105mm F/2.8G IF-ED macro lens, mounted to a copy stand directly perpendicular to the decorated face of the object, for high-resolution images. Professional quality lighting was used to provide favourable shadow through manipulation of light direction and angle to highlight engraving in these images. All images were modified for white balance in post-production using GIMP software and cropped. The full image catalogue is presented in appendix 2 for the plaquettes and appendix 4 for the decorated organics. Macroscopic descriptions of the plaquettes are presented in appendix 1 and the decorated organics are presented in appendix 3. A count of lithics is presented in appendix 5 and an image catalogue of a random sample of stone tools is presented in appendix 6. A simple sketch diagram was produced during this initial assessment, noting the details of each engraving, and any other features of note. As well as aiding in the description of each plaquette, they also acted as an initial basis for comparison with those interpretive images published by Sieveking (1987a).

A range of attributes was described and recorded for each art object, stone and organic, where present. These categories were derived in part from Sieveking's (1987b) regional synthetic analysis of art, infused with specific additional categories as observations were made during the macroscopic analysis. These attributes are detailed below. While part two was designed as a blind re-assessment of Sieveking (1987a), it also went beyond and highlighted areas that required further analysis, capitalising on techniques not available 30 years ago. To understand the object biography, the technological choices made during the production of plaquettes and the processes that produced other traces present on the plaquettes must be explored. Phase two was an opportunity to formulate additional research questions linked to the specific observed attributes identified during the blind analysis pertinent to the biography of the plaquettes. Specific techniques were selected to address those questions, based on the testing of techniques conducted during part one. The additional trends identified from the results of part two are considered below. Critically, part three moves the analysis from mere identification of traces to the analysis of those traces.

3.8.1.2.1. Size and Shape

Sieveking's (1987a) published measurements are retained in this study, being sufficient to convey an accurate sense of the size of each plaquette for the purposes of this analysis.

Accurate measuring necessitates handling and the research context did not permit this. Sub-millimetre measurements have been produced via the production of high-resolution 3D models (appendix 7), effectively removing this limitation, though sub-millimetre accuracy does not convey additional pertinent information to any subsequent analysis or interpretation that the Sieveking measurements do not already communicate.

3.8.1.2.2. Material and Its Nature

Sieveking (1987a) acted as a point of reference for the type of material used to make plaquettes. The colours, textures and types of materials were noted. The type of material was established based on its colour, texture, grain size and inclusions. Inferences were drawn about the processes to which the support might have been subject, such as signs of weathering, transport or breakage. Fresh surfaces were consulted where supports had been recently broken, which prevented a complete reliance on the interpretation of weathered surfaces.

3.8.1.2.3. Material Colour

A description of the colour across the obverse, edge and reverse surfaces was noted. This was given as an approximation based on a visual analysis with the naked eye. When the colour was more mixed or complex, a correspondingly more complex descriptor was given, for example "deep orange/brown", with first colour listed being the primary colour, and some note made of the intensity and shade of the colour. This was supported by photographic evidence of areas of major colour variance to allow for future independent consideration. This photographic record replaces an attempt to descriptively quantify the colour, such as through the Munsell system.

3.8.1.2.4. Engraving

The presence/absence, number, type and placement of engravings was explored. The composition of each depiction was considered, how each depiction interacted and their ordering, as well as more challenging attributes such as relative differences in skill and technique, which might be used to infer something of authorship and social gestures.

The broad style of each depiction was assessed following Sieveking's (1987b) categories of 'naturalistic', 'schematic' and 'abstract'. Naturalistic depictions closely replicate the specific anatomical attributes of the species depicted. Schematic depictions are similar, being recognisable to species but simplified and not anatomically accurate, possibly due to a lack of skill. Abstract relates to a non-real-world depiction, including therianthropic forms, geometric motifs or signs.

With animal depiction, the species was noted where possible. There is an assumption at this stage of analysis that depictions are somewhat literal, for example that a depiction of a horse can be taken to represent a horse. The specific anatomical details were considered, exploring the likely species, age, season and behaviour of the animal depicted. Further details were then extracted about each depiction or series of depictions. Competency was assessed with the use of Guthrie's (2005) checklist of skill assessment in art. This parallels attempts to assess skill in stone tool reduction sequences (e.g. Pigeot 1990; Grimm 2000).

Many of the plaquettes display multiple depictions, often with superimposition and change in orientation. Understanding how each specific depiction was composed is a significant component in the object biography of each plaquette. It is significant that some designs seem to incorporate natural features in the material. Fritz (1999) has identified a specific formulation for the drawing of ungulates in a study of Magdalenian art in France. Research by Fritz was used as a departure point for the analysis of line order for the plaquettes from Montastruc. Not only is the order of lines of interest but also their relative skill and artistic accomplishment. This is significant to the social dimension of production and exploring skill and authorship for the collection. Variance in the types of depiction were assessed for conformity and divergence to any common schema by studying each depiction line by line and assessing how each was made (Dobres 2000).

3.8.1.2.5. Polish

Polish was recorded at the level of presence/absence, with its location, quantity and intensity described and noted on the sketch plan of each support. Any pertinent accompanying details were noted, such as whether the polish was above or below a depiction, and its colour. Where possible, inference was offered as to whether this was a natural or anthropogenic polish.

3.8.1.2.6. Wear

Wear was recorded in the same way as polish, at the level of presence/absence, with its location, quantity and intensity described and noted on the sketch plan of the piece. Any pertinent accompanying details were noted, such as whether the wear was above or below a depiction, and its colour. Where possible, inference was offered as to whether this was a natural or anthropogenic wear.

3.8.1.2.7. Colourants

Colourants were assessed, in the first instance, via the naked eye and use a hand lens, noting the colour and distribution. The relationship to engraving was also noted, this being a possible criterion for intentionality. An attempt was made to discern natural (manganese, sediment) or anthropogenic (red ochre, charcoal) traces, and in the latter case the type of colourant.

Both red and black colouration was identified on some of the plaquettes. While the black traces may be associated with burning and/or the post-depositional burial environment, they my equally represent the remnants of the colouring of engravings. Similarly, red traces may be linked to the colouring of the surface with red ochre. However, as some sediment is present on some of the plaquette surfaces, and this sediment is often orange clay/silt, there was a need to establish the difference definitively if possible. Establishing the composition of both traces is significant. The plaquettes have no doubt lost a great deal of detail due to erosion and any colourants are likely to have been heavily effected, not least due to post-depositional cleaning practices. Establishing that the plaquettes were once coloured, and whether they were monochromatic or polychromatic, and the order of working between colourants and engraving, all contribute to the understanding of how the objects were made. Assessing the types of sediment adhering to the plaquettes may be one avenue to generate a sense of whether these reflect a collection or a diverse set of objects based on where they were deposited in the site.

3.8.1.2.8. Heating/Burning

The recognised traces for heating and burning take the form of physical modification to the support, notably cracking, pot lids, breakage, and colour change. Additive traces may include charcoal residue deposited as a result of direct contact with heat. An effective parallel is work undertaken to understand fire-cracked rock (FCR) and fire modified rock (FMR) (e.g. Dumarçay and Caron 2010). Establishing burning temperature, the nature of the burning event, and intentionality are significant research questions that will contribute significantly to the understanding of the later stages of the life history of the plaquettes.

3.8.1.2.9. Breakage

Edge shape was used as a proxy for breakage. Angular edges were used to infer a break; edge roundedness was used to infer a long-standing and likely weathered surface. Colour was used as a secondary criterion to help infer the age of a break, as was the disruption of any engraving. A change in colour with a fresher surface indicated a recent break, as did a disruption of an engraving, while a similar colour between broken edge and broader surface suggested an old break, especially if accompanied by edge rounding or if decoration cut across the break. Natural vs. intentional breakage could be inferred through, for example, the presence of pitting from hammer marks or traces of conchoidal fracture. Heat fracture could be inferred from an uneven surface and steep plains of breakage, as well as colour.

High rates of breakage are evident across the collection and in different forms. Some of this breakage may be a result of thermal alteration due to proximity to a heat source. Understanding how the limestone fragments under different heating conditions, proximity to source, and repeated burning events, contributes to reconstructing the burning episode. Some breakage is fresh and likely the result of modern excavation or curation damage. How this breakage was generated, whether through accidental/intentional thermal fracture and accidental/intentional fragmentation are significant choices that shape the plaquette object biography.

3.8.1.2.10. 'Modern' Anthropogenic Impact

Many of the plaquettes show traces of the addition of white ink to increase the clarity of engravings for museum display, likely applied in the 19th century. Other plaquettes show traces of salt evaporite deposits, linked to their historical storage. These traces were described macroscopically and microscopically when encountered, and their intensity, location and their provenance noted. The presence of evaporites necessitated immediate conservation in some cases, limiting the scope for further analysis.

3.8.1.3. Part Three: Targeted Techniques

Patterns identified in part two of the analysis was used to frame testable research questions. The questions are diverse by necessity: to explore the full object biography of any specific object is to encounter the interconnectivity of the hunter-gatherer material world. However, these points are unified in that the resolution of each research question contributes to a gradually forming picture of plaquette biographies. The following section details the specific techniques utilised to analyse patterns of interest identified in part two. The methods are inter-linked, and many of the research questions begin to merge and form component parts of the same protocols, beginning the process of unifying the various traces into a coherent object biography.

3.8.1.3.1. Microscopy

A x10 – x20 binocular microscope mounted on an armature was used alongside LED cold light sources on swan neck attachments to provide localised oblique light sources (fig 3.2.) to analyse the relationship between lines on engraved art pieces. The armature allowed the microscope to move above the art object while keeping it in position, avoiding handling. The direction and number of incisions composing each line, changes in pressure along the line, based on micro-striations within each groove, when taken together, can give a sense of the skill of the artist (Fritz 1999, 193).

Figure 3.2.

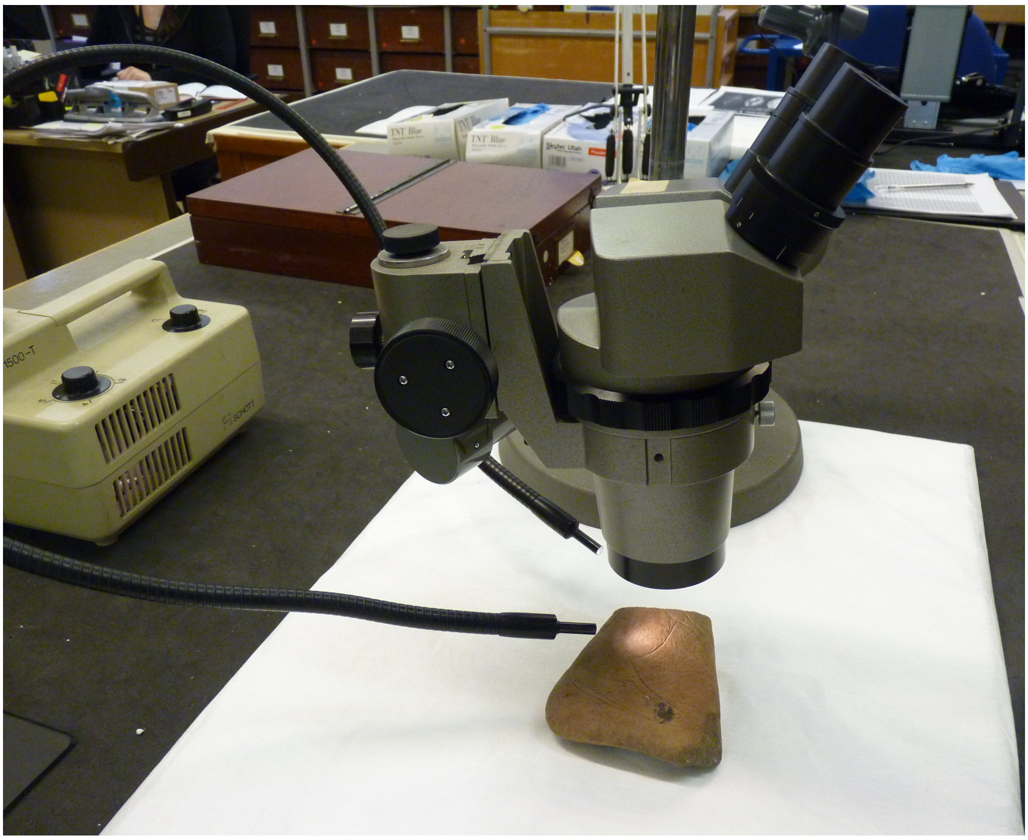

Figure 3.2. showing the set up of the microscope on armature, with cold light sources that can be manipulated into position to light the area under investigation by the microscope. Image: author.

As the microscope could not record images directly, a digital Dino-Lite Dino-Eye AM7023 microscope attachment was trialed. This had the advantage of slotting into the eyepiece as a replacement to the usual optics and a USB connection to a computer where digital stills could be recorded of the output. In this particular instance, the capacity to exploit the same microscope and armature was a key advantage. However, no microscopic photographs of sufficient quality were captured during the trial due to the low resolution of the Dino-Eye sensor (1.2MP). Visual recording of the plaquettes is limited to macro photographs and high-resolution 3D models and stills as a result.

3.8.1.3.2. 3D Modeling

A 3D Structured Light Macro Scanner was used for 3D modeling the Montastruc plaquettes (fig 3.3.), owned by the Fragmented Heritage Project, University of Bradford. The scanner was mounted on a tripod and used in conjunction with a turntable. As a light-based method, a low light level is required to produce optimum results, so scanning took place in a dark room and with the turntable housed in a black cloth-covered frame. The scanner

Figure 3.3.

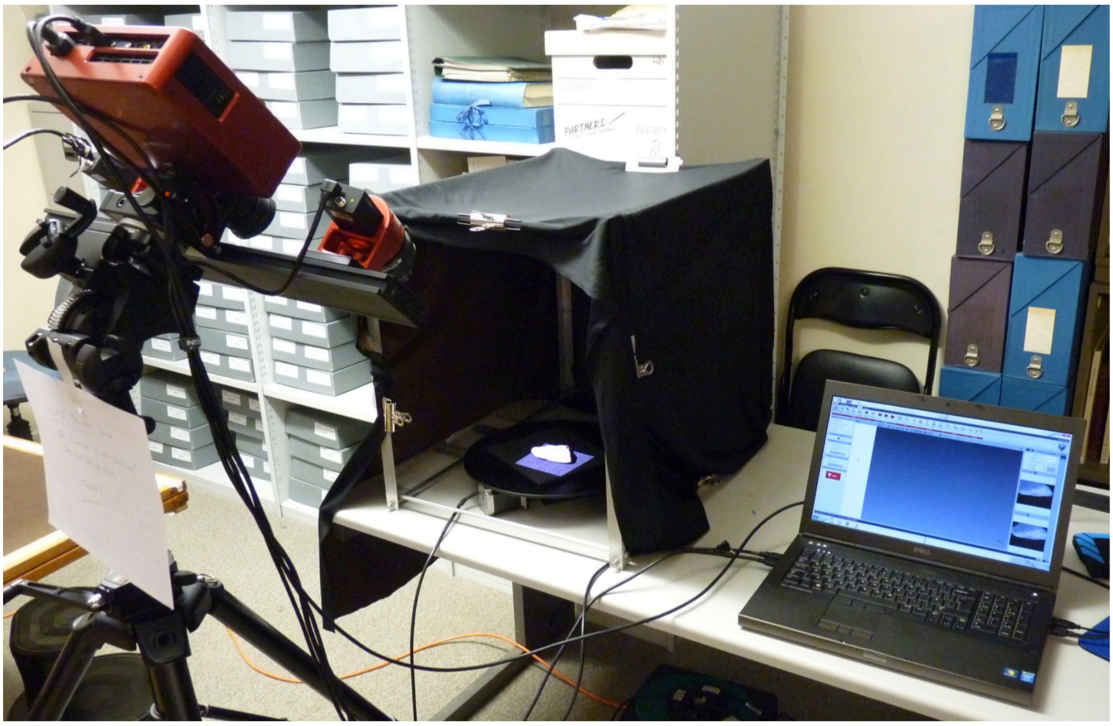

Figure 3.3. showing the set up of the macro 3D whitelight scanner, in the process of beginning a scan of a plaquette. Image: author.

and turntable was controlled using FlexScan 3D (v.3.1.1) software. The scanner was set for an 80mm field of view, and the rotary table was set for six scans per full rotation (60^{o} intervals). For larger objects additional scans were required. In these cases, the object was manipulated to ensure that all parts of the surface were captured multiple times and from multiple angles. Scans were aligned and combined in FlexScan 3D and the final model was exported as an object file. MeshLab (v.1.3.3) software was used to analyse the models. This is a technique that has successfully been applied to plaquettes (Güth 2012) and was used in concert with microscopy to record the plaquettes in sub-mm detail. It has the advantage of capturing the whole stone support to a high degree of accuracy, important in studies of object biography where the support is understood to be a shaping influence on the art produced (Robert 2016, 6). Structured light macro scanners are also rapid, taking seconds to produce a complete scan, and provide a high resolution model that is comparable with the outputs of laser scanners. Models were produced to the highest detail possible within these parameters and are presented in appendix 7.

3.9. Summary

The utilisation of object biography, understood to be overtly social as much as technical, alongside elements of a non-western relational perspective in which animals, things and the environment can be active in chains of production, alongside new high-resolution digital methods, is one suggested alternative approach to Palaeolithic art to move beyond the limitations of what has been a highly orthodox approach centred around the visual and finished form, foiled by a western worldview. In applying this approach to plaquettes from Montastruc, an array of new attributes of the objects, and research questions about those attributes, can be posed. Working through a detailed case study of material from Montastruc, demonstrating how the approach works when applied to an assemblage, occupies the remainder of the thesis. The application begins by creating a contextual frame at a broader level, with chapter 4 providing background to the Magdalenian lifeway, focussing on the broad categories of humans, animals and things. These broader insights are used in turn to aid in the contextualisation of Montastruc itself, with chapter 5 presenting the results of the analysis of a diverse range of some 15,620 objects. Taken together, and comparing the signature of activity they represent to the broader Magdalenian lifeway articulated in chapter 4, some sense of patterns of occupation and activity are constructed at Montastruc. This in turn provides a contextual frame at the smaller scale surrounding the activity of art making and use at Montastruc. Chapters 6, 7, and 8 present results of analyses of the plaquettes as broad phases in an object biography, comparing the plaquettes to the organic art signature at each stage but also using the broader activity at the site to embed the material within a site context.

Chapter 4. Building a Contextual Frame: The Magdalenian Meshwork

Chapter 4. Building a Contextual Frame: The Magdalenian Meshwork

4.1. Context Building: Humans, Animals and Things in the Magdalenian Meshwork

The exploration of animistic and relational ontologies following a close reading of material culture through object biography necessitates an understanding of the context surrounding the material culture in question. In this case, engraved plaquettes from the site of Montastruc necessitate an appreciation of the broader Magdalenian lifeway. This requirement is a significant challenge for a site that is, by virtue of its method of excavation in a 19th century context (chapter 5), almost completely unstratified and without context. This poses a key question for Palaeolithic art studies: how can contextual approaches be applied to collections with limited context? This is significant as to limit the application of contextual approaches to sites and collections excavated to modern standards would preclude most curated historic collections from any depth of (re)analysis. This is inadequate as a significant component of known Palaeolithic collections can be so described. It is telling that Montastruc is one of the most significant holdings of Palaeolithic art in the UK but has received only summary publication (Sieveking 1987a) bar some targeted objects (Cook 2010; Farbstein 2013), with the majority of objects never published. What has been lost through 19th century excavation practice cannot be recovered, nor can context be rebuilt to a modern standard. However, some sense of context can be generated through a novel approach: the building of *contextual frames*. The plaquettes from Montastruc can be envisaged as a knot within a mutually constituting meshwork (Ingold 2000; 2012); unpicking the knot and exploring the threads that are entangled in its tying can add to an understanding of the object, helping to trace pertinent aspects of the context that has been lost. This chapter attempts to build a contextual frame around the material from Montastruc to develop a point of comparison for material culture from the site. In turn, a deeper understating of activity at the level of the site will act as a contextual frame around the engraved plaquettes themselves, allowing for deeper insights into the biography of the plaquettes. The contextual frame itself is formed through an exploration of the Magdalenian, inspired by the animistic and relational approach, creating resonance between the contextual frame and the site and collection to which it is applied.

The chapter summarises aspects of the Magdalenian lifeway and material culture correlates, forming a contextual backdrop to patterns of behaviour within the Magdalenian at the large scale, which can be used to model patterns of activity at a site with only limited context. Naturally, it is not possible to cover all pertinent themes within the Magdalenian and those discussed are both simplified and generalised, compressing the spatio-temporal variance present within the Magdalenian. The themes selected for consideration are those pertinent to the understanding of Magdalenian art, and the plaquettes from Montastruc, resonating with themes discussed in chapter 3: *humans*, *animals* and *things*. The formalisation of these categories creates a false and overly firm division between what are deeply intertwined domains. This necessary separation is one of convenience rather than a strictly meaningful partitioning of the Magdalenian world. The discussion of art, which follows, goes some way to demonstrating how these elements could become intertwined. Ethnography highlights the connection between art and ontology, supporting this exploration of an animistic relational ontology in tandem with Magdalenian art at the broad level (Bird-David 2006, 46).

4.2. Weaving a Course Mesh: Defining the Magdalenian, Its Temporal and Geographical Scope and Environmental Context

The Magdalenian is a cultural attribution given to sites that occur after the Last Glacial Maximum (LGM), chronologically younger than the preceding Solutrean and Badegoulian periods that straddle the LGM (Schwendler 2012, 333). The Magdalenian dates to the Late Upper Palaeolithic, between 20,655-20,359 cal BP (95.4% confidence) – 13,860-13,749 cal BP (73.9% confidence) (Schwendler 2012, 333) and emerged from Spanish and Southern French refugia (Otte 2012, 354; Straus 2013, 241, 244). There are numerous systems of sub-dividing the Magdalenian with the most common composing of a Lower Magdalenian, dating to *c.* 20,635-20,359 cal BP (95.4% confidence) – 17,856-17,531 cal BP (95.4% confidence), a Middle Magdalenian, dating to *c.* 17,856-17,532 cal BP (95.4% confidence) – 15,726 – 15,360 cal BP (95.4% confidence) BP, and an Upper Magdalenian, dating to *c.* 15,726-15,360 cal BP (95.4% confidence) – 13,860-13,749 cal BP (73.9% confidence) (Langlais 2011, 716; Schwendler 2012, 336). There is localised variability in these general temporal ranges and occasionally an Initial Magdalenian and an Epi-Magdalenian are also included (e.g. Straus 2013).

The Magdalenian was preceded by climatic oscillations, most notably stadial and inter-stadial events creating spikes in cooling and warming respectively (Lowe and Walker 1997, 330). The Magdalenian falls across Marine Isotope Stage (MIS) 2 and 1. MIS corresponds with the quantity of ice on the land, and so climate (Lowe and Walker 1997, 326) and can be measured through relative proportion of light (^{16}O) and heavy (^{18}O) oxygen isotopes present in ice core samples. A sample depleted in ^{18}O and enriched in ^{16}O indicates a cold temperature and an even mixture of ^{16}O and ^{18}O indicates a warm temperature. This is as a result of lighter isotopes being preferentially deposited on the land in ice as a result of evapotranspiration during cooling cycles and glacier formation, leaving the ocean rich in heavy isotopes. The beginning of MIS 2 represents peak cooling, the LGM, dating to *c.* 21,953-21,632 cal BP (95.4% confidence), varying by region (Lowe and Walker 1997, 338). The temperature was cold and severe, broadly reflecting an arctic climatic regime, with steppe-tundra vegetation and a temperature range of 10°C at seasonal maximum and -25°C at seasonal minimum (Lowe and Walker 1997, 336). During peak glacial conditions, sea level was as low as 120m below present levels, with vast quantities of ice locked in glaciers on the land and freeing tracts of coastal land, such as Doggerland (Lowe and Walker 1997, 334). Northern latitudes and high, mountainous regions were depopulated during the LGM, with the intensity of cold temperatures being too severe for human occupation. Humans instead retreated to low altitude, relatively moderate climatic refugia, notably southern France and Spain (Schwendler 2012, 336). The Magdalenian falls across MIS 2 and 1, a cold phase (2) moving into a warm phase (1), a period otherwise termed the Late Weichselian (Lowe and Walker 1997, 326). MIS 2 and 1 are part of a larger cycle of glacial and inter-glacial cycles, representing the terminus of a glacial that began in MIS 5 around 130,000 BP but is more properly represented by MIS 4, 3, and 2 (Lowe and Walker 1997, 327-334). The Magdalenian thus reflects adaptations to an environment that was cold but gradually warming.

The period after the LGM, and that aligning with the Magdalenian, is one of gradual climatic amelioration. This was punctuated by Heinrich events, periods of increasing cold and ice expansion marked by the heightened frequency of ice-rafting, with vast icebergs detaching from bodies of ice which cooled ocean temperature (Lowe and Walker 1997, 148). The Heinrich event between 23,065-22,692 cal BP (95.4% confidence) – 21,309-20,952 cal BP (95.4% confidence), with a shift to steppe environment likely dominated with a reduction in trees, is one example (Langlais 2011, 717). Increasingly cold conditions with the onset of Heinrich events encouraged the development of open steppe environments, which in turn facilitated a proliferation of large steppe ungulates, perhaps in the order of a tenfold increase (Langlais *et al* 2012, 142), with numbers receding as the environment ameliorated through time. Warming was at times rapid, perhaps as much as 7°C per century by 18,357-18,079 cal BP (95.4% confidence) (Lowe and Walker 1997, 343), but was subject to rapid cooling during subsequent Heinrich events, such as during 18,357-18,079 cal BP 995.4% confidence) – 17,164-16,817 cal BP (95.4% confidence) (Lowe and Walker 1997, 341). The transition to MIS 1 was marked by oscillating stadial and interstadial events, the Bølling warm phase (15,726- 15,360 cal BP (95.4% confidence) – 13,800-13,749 cal BP (95.4% confidence)), the Older Dryas cold phase (13,860-13,749 cal BP (73.9% confidence) – 13,725-13,554 cal BP (95.4% confidence)), the Allerød warm phase (13,725-13,554 cal BP (95.4% confidence) – 12,935-12,775 cal BP (90.4% confidence)) and the Younger Dryas (12,935-12,775 cal BP (90.4% confidence) – 11,498-11,340 cal BP (59.7% confidence)), before giving way to the Holocene, the start of the next inter-glacial (Lowe and Walker 1997, 342). The Magdalenian marks the beginning of a reversal in the trend towards depopulation of locales and retreat into southerly refugia and the beginning of a gradual reoccupation of previously ceded ground, facilitated by post-LGM climatic amelioration (Mevel 2013, 385).

4.2.1. Magdalenian Recolonisation

The Magdalenian is a period marked by movement within this frozen landscape. At the geological scale, vast tracts of Europe were rapidly recolonised as environments became fit for human habitation, as well as animal and plant life due to ameliorating climate. As much as movement reflects a pragmatic response to changing environmental and ecological circumstances, movement is, at the human scale, socially significant and facilitated by a network of social relationships (Riede and Tallavaaraa 2014). The pattern of Magdalenian recolonisation is perhaps best understood as a product of both. Cultural change and spread would appear to be linked to these variations in environment across the Magdalenian period, as is the spread and expansion out of southwest France and northern Spain (Langlais 2011; Straus 2013, 248). Colonisation was likely supported by both an increase in ungulate biomass and complex, long distance exchange networks (Langlais 2011, 725; Straus 2013, 147; Taller *et al* 2014, 395). This is a period in which human-human and animal-human relations were critical to survival, typically negotiated through material culture.

Repopulation (table 4.a.) can be broadly characterised as beginning from southern, low altitude refugia in northern Spain and southwest France during the Middle Magdalenian, following initial spread across the southeast during the Lower Magdalenian, to upland locales such as the Pyrenees, and north to northeast France and southwest Germany, with the site Hohle Fels emerging an important early example of recolonisation into the latter (Taller *et al* 2014). Colonisation has been modeled through radiocarbon dates to produce broad multi-regional models, with Housley *et al* (1997) being notable pioneers. This has drawn debate due to a lack of date calibration (Blockley *et al* 2000; Housley *et al* 2000), encouraging further attempts (e.g. Blackley and Buck 2003; Blockley *et al* 2006; Gamble *et al* 2005). By the end of the Upper Magdalenian, there was extensive reoccupation of even high altitude zones and locales as far removed as the UK (Schwendler 2012, 336). Some high-resolution analysis has been undertaken that reveals specific recolonisation patterns along this SW/NE axis. Miller (2012) has used a broad analysis of radiocarbon dates to plot movement out of the southwest. Otte suggests the patterns of spread, when considered alongside the material culture from each sub-phase, indicates multiple waves of colonisation, especially in the later phases of the Magdalenian (Otte 2012, 358-359) and into upland locales (Mevel 2013, 389). Early dates of colonisation are found in Spain and France, as well as Portugal (Bicho and Haws 2012) and Germany (Jochim 1995; Jochim *et al* 1999; Street *et al* 2012). The Netherlands shows some occupation, especially in the loess belt, linking sites around the Ardennes in Belgium and parts of Germany, connected by the exploitation and transport of Meuse flint (Rensink 2012, 251, 261). The occupation of Belgium followed a similar pioneer/residential pattern of colonisation with the earliest date of *c.* 18,575-19,287 cal BP (95.4%) coming from the site of Vaucelles Blaireaux (Miller and Noiret 2009, 40). Poland and the UK acted as the far extents of the Magdalenian world, both displaying ephemeral occupation, with relatively early dates recovered from Poland at Maszycka cave, dating to 19,511-18,074 cal BP (95.4% confidence) (Połtowicz-Bobak 2009, 55, 57) and Klementowice, which may be earlier still (Wiśniewski *et al* 2012).

The occupation of the UK was short-term, perhaps only between 18,021-17,756 cal BP (95.4% confidence) – 17,351-17,005 cal BP (95.4% confidence), with specific sub-cultural groups thereafter (Bicket and Tizzard 2015, 656; Pettitt *et al* 2012). Gough's Cave, Sun Hole, and Kent's Cavern to the south, and Creswell Crags and Kendrick's Cave to the north and west represent the most significant sites with Magdalenian occupation with confirmed Late Magdalenian dates (Jacobi *et al* 2009; Pettitt and White 2012, 461-468). The Creswellian, a term coined by Garrod (1926) to describe the Magdalenian lithic industries of the UK, likely over emphasises the difference between the UK and the continent (Pettitt and White 2012). This is also the northern frontier for Magdalenian artistic expression, with the clearest case at Creswell Crags (Pettitt *et al* 2007; Bahn and Pettitt 2009) and a possible case at Kent's Cavern (Mullan *et al* 2006).

Minimally, humans had to pass across Doggerland, even if only the narrow straits between modern day southern England and northern France, to reach the UK, for which there is modest but unambiguous Magdalenian activity (Terberger *et al* 2009, 196). However, the extent of activity is unclear due to the difficulty in conducting any archaeological activity in a fully submerged locale and the small number of sites located (Bicket and Tizzard 2015, 651; Engen and Spikins 2007). Recent mapping work has suggested the morphology of the land was likely flat with large river systems (Coles 1998; Gaffney and Fitch 2009; Gaffney *et al* 2007) and much of the archaeology may have been buried or displaced due to large bodies of water and rapid sedimentation caused by the retreat of glaciers (Bicket and Tizzard 2015, 656). The lack of direct evidence for occupation of Doggerland is anomalous. There is increasing evidence for significant Mesolithic activity across Doggerland (e.g. Andersen 1985; Grøn and Skaarup 1991), suggesting that the aforementioned problems associated with recovery are not so severe as to entirely frustrate the investigation of early prehistoric archaeology, but as yet no major Magdalenian presence has been reported (Bicket and Tizzard 2015). The final phases of colonisation occurred in northern latitudes. Magdalenian and Late Palaeolithic industries have also been discovered as far North as Denmark (Mortensen *et al* 2014; Wygal and Heidenreich 2014), Sweden (Gustafsson 2014; Wygal and Heidenreich 2014), Norway (Wygal and Heidenreich 2014), Fennoscandia (Wygal and Heidenreich 2014) and Scotland (Mithen *et al* 2015; Wygal and Heidenreich 2014).

Table 4.a.

Date Range	No. of Dates	No. of Sites	Geographical Distribution	Cultural Distribution
20-19,000 cal BP	31	20	SW and central France, Switzerland, Swizerland, <47°N	Proto-Magdalenian, Badegoulian
19-17.5,000 cal BP	64	49	(primarily) SW and central France, S Germany, Poland, >47°N	Magdalenian
17.5-16.5,000 cal BP	68	55	SW and central France, S Germany, Poland, Switzerland	Magdalenian
16.5-14.67,000 cal BP	156	84	(dense) S Germany, Paris Basin, SW and central France, Switzerland, Belgium, (further East and North)	Magdalenian
14.67-14.1,000 cal	87	50	S France, S Germany, >50°N,	Magdaleninan,

BP			Belgium, England	Hamburgian in Germany,
14.1-13.9,000 cal BP	41	35	France, Germany, Switzerland, Belgium, Netherlands	N Germany Hamburgian, Germany federmesser, Switzerland and Paris Basin Azilian
13.9-12.9,000 cal BP	250	130	SW France, Paris Basin, Meuse Basin, N Rhineland, S Germany (all densely occupied), England, Denmark	Presumed to be as above? – final Magdalenian
12.9-11.5,000 cal BP	202	118	SW France, Paris Basin, Meuse Basin, N Rhineland, S Germany, England, Denmark	Non-Magdalenian

Table 4.a. showing the spread of the Magdalenian geographical spread of the Magdalenian through time. Data derived from Miller 2012. Image: author.

4.3. Weaving a Fine Mesh: Humans in the Magdalenian

How humans interacted with one another, their subsistence, health, treatment at death, varying roles of age/sex groups, and social relationships within and between groups is explored in considering the Magdalenian human. In exploring these areas, a composite picture can be formed about some aspects of how Magdalenian humans negotiated their world. A composite of this nature necessarily reduces spatio-temporal variance and complexity to produce a general sense of Magdalenian humans, but this is adequate for use as a course grained contextual frame.

4.3.1. Population Size

The population of Magdalenian northwest Europe has been estimated to be as little as *c.* 28,800 people (Bocquet-Appel 2000; Bocquet-Appel *et al* 2005). While small, this is a rapid expansion when compared to preceding periods, where the population may have been as low as 4,400-5,900 inhabitants before the LGM (Bocquet-Appel 2000; Bocquet-Appel *et al* 2005). An increase in population size likely necessitated a diversification of diet and resource exploitation in the environment. A specialised strategy limits population to the carrying capacity of the targeted resource (Burch 1972, 364-365). This accords well with known Magdalenian diet and resource exploitation patterns. In a population so small, the maintenance of strong and lasting social relationships was key to survival, not least to ensure genetic diversity. A low population density likely encouraged an exogamous mating network facilitated by social ties between groups. Exchange relationships perhaps played a pragmatic function in the transfer of material culture but more importantly was a significant mechanism in keeping distant populations connected to offset risk during times of hardship, a practice common in the ethnographic record (e.g. Apicella *et al* 2012; Whallon 2006; Wiessner 2002). This was perhaps more pressing in an environment marked by a harsh climate. Beyond the pragmatic, humans are a deeply social species and Magdalenian humans were likely no different, encouraging connection within and between groups (Aiello and Dunbar 1993; Dunbar 2007; 2012). Aggregation events, potentially recognisable in the archaeological record by the presence of diverse types of material culture found in the same locality (Conkey 1980), as well as by quantity of occupation debris, were likely significant in facilitating social, material, and genetic exchange, and significant in the continued success of populations within a specific region.

4.3.2. Characterising Mobility, Exchange and Social Networks

There is evidence for the long distance movement of groups and individuals within the Magdalenian, reflecting a network of social relationships cutting across social groups, supported by evidence for aggregation events (Conkey 1980). For example, the recent discovery of a cetacean bone working tradition in the Magdalenian of southwestern France, alongside the identification of this same rare material at inland sites, offers an insight into mobility, exchange, and social relationships between groups (Pétillon 2013, 526). Pétillon identified a cluster of 63 anomalous bones from the site of Isturitz from its Middle Magdalenian layers, later discovered to be whale bones (Pétillon 2013, 526, 529). This industry suggests a significant role for coastal resources in the Magdalenian, largely masked due to sea level rise and the loss of coastal sites (Pétillon 2013, 525). Denser and longer bone portions were used to manufacture durable projectile shafts and/or wedges, implicated in hunting technology (Pétillon 2008, 723-724; 2013, 532-534).

The collection of whale bone likely necessitated a journey of some 50-60km (Pétillon 2008, 724) and 46 pieces of whale bones were found further inland across a number of sites beyond Isturitz (Pétillon 2013, 529). The spread of these pieces was limited to the Atlantic (West) coast and central regions of southern France with no continuation over to the Mediterranean (East) coast (Pétillon 2013, 530) and span the period 17,500-15,000 cal BP (Pétillon 2013, 531). These sites lacked working debris and so were not sites of manufacture as at Isturitz. Instead, they were recipients of whale bone objects sourced and fabricated on the west coast and traded or moved inland, a distance of around 300km

(Pétillon 2013, 535). This may under-represent the range based on recent finds from Andernach-Martinsberg, Germany (Langley and Street 2013).

There is evidence for protracted movement not only of groups but also specific individuals during the Magdalenian. At the site of Andernach-Martinsberg, dating to 13,800 cal BP, a worked cetacean bone, broken in use and likely curated (Langley and Street 2013, 462-63), was found in association with a collection of 46 worked marine shells, and a slate plaquette with an engraving of a seal, all in association with a fissure (Langley and Street 2013, 46-61). The likely source of the cetacean bone, and perhaps by extension the shells, is the SW French coast, 1000km away. It is likely that specific individuals made this journey, the plaquette being made of local stone but sporting a non-local design (Langley and Street 2013, 464). The broader range of objects may suggest a more significant interaction between Magdalenian groups from France and Germany (Langley and Street 2013, 464). Together, these finds suggest a well-established relationship between coastal and inland communities over long distances in the Magdalenian, mediated through exchange of rare animal elements (Pétillon 2013, 536).

There is also evidence for the coming together of humans. Conkey (1980), working with material from Mas d'Azil and Isturitz, found a diverse range of artistic styles. This was used as the basis to suggest that different communities were responsible for manufacturing art of varying styles, aggregated together at these sites, with the diversity of the material culture signature evidencing this. Potentially any body of material culture might be used to assess aggregation of diverse groups in this way, Conkey's (1980) key criteria is the depth of diversity present at a site at a given time. There are clear advantages to aggregation, such as facilitating exogamous mating networks and gene flow, but also maintaining social networks, with the flow of material culture between groups likely being a significant part of how these relationships were maintained. Support for this approach may stem from a parallel Aurignacian study in which it was suggested that a diversity in shell and tooth ornament type by region reflected varying ethno-linguistic groupings (Vanhaeren and d'Errico 2006). If this is the case, it is conceivable that a high diversity of art at a site could reflect the coming together of several such groups.

As expansion was rapid and into unchartered areas, it is thought that an emphasis on exotic items and exchange was a key means of holding together increasingly stretched and dispersed social networks to pool risk (Langlais *et al* 2012, 138; Straus 2013, 249). Schwendler (2012, 338) notes that just as environment, topography and geographical features changed, whether temporally through environmental change or the colonisation of previously abandoned regions, it is probable that social structures, population size and demographics would correspondingly shift. The makeup of associated material culture to any given population likely reflects these changing social and population dynamics, with larger groups being more reliant on material culture to maintain extended, distributed and numerous relationships between large and dynamic groups (Schwendler 2012, 339).

4.3.3. Age, Sex and Social Structure

A more intimate scale of social relationships can be explored through the making of material culture (Dobres 2000). The making of stone tools at Étiolles, France, dating to 14,740-14,036 cal BP (95.4% confidence) (Fritz and Tosello 2011, 28) is a particularly clear example. Etiolles is marked by excellent preservation, characteristic of sites in the Paris Basin, facilitating work by Pigeot (1990) that demonstrated a relationship between skill, space, and access to chert and flint. Chert and flint from Étiolles included cores of over a metre in length. Such cores were as difficult to work as they were to acquire. If worked skillfully, they held the potential for the production of very long blades (Pigeot 1990, 126).

Pigeot (1990, 138) found that only the most skilled gained access to the largest nodules, and lesser skilled individuals were limited to working smaller nodules that were easier to work. This pattern also had a spatial dimension, with more skillful knapping located closer to hearths within structures, with skill gradually decreasing with distance from this position (Pigeot 1999, 132). Pigeot argued this pattern reflected pragmatic distribution of stone linked to skill and a reflection of possible stages of apprenticeship, linked with the gradual learning of the complex procedure of creating long blades (Pigeot 1990, 134). The pattern reflects a social landscape in which the young and inexperienced might at first imitate others to generate the basic skills of flint knapping. Once learned, there was active teaching and intervention by older and more experienced group members to facilitate the production of useful end products (Pigeot 1990, 136-137). The presence of both apprenticeship and knapping reflecting unnecessarily high skill implied the presence of specialists within Magdalenian society (Pigeot 1990, 139).

Schwendler's (2012) assessment of social structure similarly concluded that there were specialists in Magdalenian society. The finding of differential skill and teaching has been confirmed by other similar studies conducted at other Magdalenian sites (e.g. Grimm 2000), but also other periods (e.g. Högberg 2008; Stapert 2007). It is unlikely that these different social positions, organised through age and skill, played out only in the production of stone tools and instead the attainment of high rates of skill and expertise was possible in most types of activity (Sinclair 2015). More likely, the stone tool record is sufficiently robust to survive and sufficiently studied to highlight what was likely a more deeply structuring principle. This pattern perhaps reflects a societal model of horizontal rather than hierarchical differentiation. In such a system, specialism is acknowledged and harnessed but rarely corresponds to formalised differences in status or leadership, which is typically resisted (Boehm 1993; 2004).

The differentiation of work by sex has been shaped by the importing of social models derived from ethnographic data and the common division of male/hunt / women/gather found therein (Keeley 2010), but is archaeologically less well demonstrated than the previously discussed case of child activity. Keeley (2010) has recently made the case for a division of labour by sex in relation to reindeer hide working from the site of Verberie, France, with some supporting comparative work by Davin *et al* (2010) on reindeer slaughter in Siberia. Keeley (2010) concludes that the working of skins was likely a female activity on the grounds of its abundance in ethnographic contexts, though there is little direct supporting evidence in the archaeological record. Such a conclusion cannot be rejected out of hand, but clearly problematisation is needed in an area heavy in assumption. Recent work in art analysis has shown greater promise, with a forensic approach implicating women and children in the production of some finger flutings and hand stencils (Sharpe and Van Gelder 2006; Van Gelder and Sharpe 2009; Morley 2007; Snow 2006). These studies are based on the measurement of the hand, heavily controlled by in-utero testosterone levels, making them a potentially predictable criterion for male or female, adult or child (Sharpe and Van Gelder 2006; Van Gelder and Sharpe 2009; Morley 2007; Snow 2006). Some type of division of labour was likely in the Magdalenian, especially given increasing evidence for social differentiation as described above, but quite how this was negotiated in particular times and places is less clear. The evidence would suggest that in some instances men, women and children engaged in activities, such as some types of art production, while in other contexts there is more control over access to material, such as at Étiolles.

4.3.4. Social Relationships: Care

A further window into the nature of interpersonal relationships can be provided through evidence for pathology of the skeleton. There is convincing evidence to suggest that bonds between humans were sufficiently close as to warrant the provision of protracted care of the ill and disabled, reflecting communities with tightly knit social structures and food sharing practices. An understanding of patterns of care is shaped by the potential for any given incident of pathology or trauma to leave a tangible trace on the skeleton. The record typically preserves conditions affecting the bones, with soft tissue conditions leaving no visible evidence. As this is a consistent error across all prehistoric periods, the pattern observed does go some way to reconstructing behaviour. These biases are also true of violence and health, discussed separately in sections that follow.

Magdalenian communities were closely knit and the provisioning of care seems to have been commonplace, in a diverse range of injuries and conditions that would necessitate lifelong support. The site of Romito 2 perhaps presents one of the clearest cases of care. Romito 2 (fig 4.1.), a male around 17 years old found at the site of Romito, Italy, dating to 13,275-12,730 cal BP (95.4% confidence) (Frayer *et al* 1987, 60), had acromesomelic dysplasia. This variant of dwarfism would have limited the range of movement in his arms, potentially limiting his capacity to engage in tasks as diverse as hunting to tool making, and would have made mobility more challenging, likely leading to increased fatigue over shorter distances, an acute challenge in highly mobile societies (Frayer *et al* 1987, 61; Frayer *et al* 1988, 556; Tilley 2015, 70). Yet, this individual was healthy, shared in the diet of the rest of the population, suggesting little status difference (Craig *et al* 2010, 2511), and received a careful burial. These attributes have been used to infer a society that cared for its members (Frayer *et al* 1987, 61; Frayer *et al* 1988, 563-564; Craig *et al* 2010, 2510; Spikins *et al* 2010, 311; Tilley 2015). This case comfortably meets the criteria set out by Tilley and Cameron for evidence of care in the archaeological record (Tilley and Cameron 2014; Tilley 2015).

This conclusion has not gone without controversy. Commenters have noted a perceived failing to allow for disabled individuals in the Palaeolithic to have an active role in society (Dettwyler 1991; Tarlow 2000; 2012). However, disability and disease did not preclude an active role in society. Romito 8, for example, an adult male exhibiting pathologies, likely undertook different tasks in life, possibly hide working based on tooth wear, and shared a similar diet to other individuals from the site (Craig *et al* 2010, 2510). On balance, and within the context of the Palaeolithic Late Glacial, he likely required some form of care. However, the provisioning of care for Romito 2 is not unique, but rather is an example that is archaeologically visible. The fixation on disability and disease reflects the nature of preservation in the archaeological record rather than strictly societal attitudes about these conditions uniquely. Soft tissue ailments do not preserve. It is likely that caring wasn't limited to those individuals with disabilities but was a wider societal strategy, flowing from familial connection in the first instance and stretching beyond that to the community level, fused to a robust social network.

Figure 4.1.

[redacted]

Figure 4.1. showing the skeleton of Romito 2, a young male with dwarfism. Image after Tilley 2015, 67.

4.3.5. Social Relationships: Violence

The Late Palaeolithic record for traces of violence in Europe is slight but important to consider in exploring the range and complexity of interpersonal relationships, not all of which were caring. Two cases of interpersonal violence are known from Italy. ST4, an adult female from the site of San Teodoro, Sicily, dating to the Epigravettian, was found with a

Figure 4.2.

Figure 4.2. showing an embedded stone projectile in the pelvis of San Teodoro 4, likely indicating violence. Image after Bachechi *et al* 1997, 138.

broken piece of a lithic projectile, likely part of a triangle associated with an arrow or dart, embedded in the right ilium (Bachechi *et al* 1997, 136-137; fig 4.2.). The injury was not lethal, with signs of healing and draining of an abscess associated with the wound (Bachechi *et al* 1997, 138). A second case of a similar age is known from layer B of the Grotta dei Fanciulli, or otherwise known as Grotte des Enfants, Italy (Bachechi *et al* 1997, 139-140). Here a child, buried as part of a double burial, was found to have part of a lithic projectile lodged within the thoracic vertebrae (Bachechi *et al* 1997, 139). A case has been made for violence at a larger scale at Maszycka cave, Poland. Here the presence of high rates of organic finished tools has been used to suggest abandonment of a site where as many as 16 individuals, represented by cranial elements, have been recovered (Pettitt 2011, 216). Pettitt (2011, 216) notes that this could reflect the death of an entire population and possible inter-group violence, with associated cannibalism. It is worth noting an increase in evidence for violence in the Mesolithic, along with the first unambiguous traces of structured violence between groups (e.g. Lahr *et al* 2016; Thorpe 2003), such as Jebel Sahaba, Sudan, dating to around 12,000 years ago, where 24 individuals out of a cemetery of 59 showed evidence of having been injured by lithic projectiles (Thorpe 2003, 152). Violence was likely present in the Magdalenian but appears to be relatively rare. There is clearer evidence for closely bonded communities and strong interaction between groups. Mobility was likely a primary mode of conflict resolution rather than violence, an adaptive strategy for highly mobile and numerically small groups (Kelly 2005). The presence of lethal weaponry may have played a role in limiting the use of violence, with the threat of lethal violence a sufficient deterrent to encourage the regulation of behaviour and avoidance of the escalation of conflict (Boehm 2011; Kelly 2005).

4.3.6. Treatment of the Body at Death

Mortuary practice can provide a window not only into social relationships, but also cosmology and ontology. Aspects of the Magdalenian record of mortuary practice shed light on these aspects, challenging the clear division between humans and things, as well as suggesting some links to the art assemblage. Table 4.b. presents a summary of recovered human remains dating to the Magdalenian. The Magdalenian human skeletal record is relatively rich, with a high-density of finds recovered from France and northern Spain. Orschiedt (2013, 217) reports that of the 232 individuals that can be attributed to the Magdalenian, 223 can be described as highly fragmentary. Primary burial is rare, with perhaps only 9 individuals being sufficiently complete to support this designation (Orschiedt 2013, 117). The record suggests a diverse array of practices associated with the treatment of the body, including primary burial, secondary burial, caching, defleshing and disarticulation, and curation of skeletal remains with or without modification (Pettitt 2011). These diverse practices may reflect a complex understanding of the body. Primary burials are often but not exclusively singular, with the body frequently in a tightly flexed posture and positioned to the side, likely presenting with grave goods, commonly art objects and beads. Remains are known from Spain, largely concentrated to the north and Cantabria, but these are largely unmodified and so it is difficult to attribute these to any particular practice (Pettitt 2011, 220). Orschiedt (2013, 117) reports that cut marks and scrape marks occur on 95 individuals and likely reflects defleshing practices. This defleshing is especially evident to the skull and there is increasing evidence for a special interest in the skull at death amongst Magdalenian humans (Orschiedt 2013, 117; Pettitt 2011, 216).

Some practices involving human body parts challenge the division between human and object. This is perhaps most clearly seen in the fashioning of human skull cups at Gough's Cave, UK, dating to 14,700 Cal BP (Bello *et al* 2011; Bello *et al* 2015; fig 4.3.) and a further 24 possible examples from Le Placard, France (Pettitt 2011, 218-220). This practice may again hint at the special significance of the head in the Magdalenian. The manipulation of skulls at Maszycka may take on a deeper significance in light of this interest in the skull. An attribution of violence in that case may only be a part of the interpretation of a perhaps more significant, cosmological practice. Other human body elements have been fashioned into objects, including teeth, cranial fragments for suspension, supports for decoration, rondelles, and even as containers for other bones (Orschiedt 2002; 2013, 127; Pettitt 2011, 223-225). For example, at the site of Brillenhöhle, Germany, dating to 15,034-14,245 cal BP (95.4% confidence), the calotte was shaped to contain the

Table 4.b.

Site	Location	Date	Culture	Sex	Age class	Age	Elements	MNI	Nature of treatment	Body position	Grave goods	Ref
La Madeleine	France	10,190±100 BP	A		I	2-4			inhumation	Laid on back	perforated shell and tooth ornaments	Orschiedt 2013, 117
Le-Rond-Du-Barry	France	17,100±450 BP	MM	M	A				placed in a niche between stone blocks		flint core, flake, retouched blade, fragment of basalt cobble, fragment of reindeer antler, bone flakes, teeth	Orschiedt 2013, 118
St. Germaine la Riviére	France	15,780±200 BP	MM	F	A					Left side, highly flexed	red ochre, 2 worked red deer antlers, perforated red deer rib, flint tools (blades, end scrapers, burins, cores), 71 perforated red deer canine, shell bead, steatite bead	Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		A						red ochre, 2 worked red deer antlers, perforated red deer rib, flint tools (blades, end scrapers, burins, cores), 71 perforated red deer canine, shell bead, steatite bead	Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		A							Orschiedt 2013, 118

St. Germaine la Riviére	France	17-14,000 BP?	MM?		A							Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		A							Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		A							Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		I							Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		I							Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		I							Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		I							Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		I							Orschiedt 2013, 118
St. Germaine la Riviére	France	17-14,000 BP?	MM?		I							Orschiedt 2013, 118
Abri Lafaye	France	15,290±150 BP	MM	F	A		fragment ary		inhumation	Right side, tightly flexed	missing	Orschiedt 2013, 118-119
Abri Lafaye	France	15,290±150 BP	MM		I	3	Partial skeleton		inhumation		missing	Orschiedt 2013, 118-119
Abri Lafaye	France				A		cranium					Orschiedt 2013, 118-119
Cap Blanc	France		MM?	F	A				inhumation	Right		Orschiedt

										side, flexed		2013, 119
Chancelade	France		MM	M	A				inhumation	Left side, tightly flexed	Red ochre, stone tools?	Orschiedt 2013, 119
Laugerie-Basse	France	15,700±150 BP	MM	M	A				inhumation	Left side, flexed	Red ochre, shell pendants	Orschiedt 2013, 119
Sorde-l'Abbaye	France	11,150±220 / 13,510±220 BP	LM/MM ?		A		fragmentary cranium, several post-cranial bones		inhumation		3 perforated lion canines, 40 perforated bear canines	Orschiedt 2013, 120
Sorde-l'Abbaye	France	11,150±220 / 13,510±220 BP	LM/MM ?		A		skull, jaw, several postcranial fragments					Orschiedt 2013, 120
Les Horteaux	France		LM	M	A				Inhumation (secondary burial?)		red ochre, perforated baton, perforated reindeer tooth	Orschiedt 2013, 120
Riparo Tagliente	Italy	13,070±70 / 13,270±170 BP		M	A		Lower body			stretched	ochre, stone slabs with engravings, fragment of bison horn, pierced shell	Orschiedt 2013, 120
Riparo di Vilabruna	Italy	12,140±70BP	FEG	M	A	25	full skeleton		inhumation		5 stones decorated with red ochre and	Orschiedt 2013, 121

							bar lower limbs				incised designs, bone point, backed knife, flint blade, flint core, retoucher, ball of resin and wax	
Grotta Maritza	Italy	14,000BP			I	7-8			inhumation			Orschiedt 2013, 121
Grotta Maritza	Italy	14,000BP			A				inhumation		flint tools, perforated shells	Orschiedt 2013, 121
Grotta Vado All'Arancio	Italy	13,400BP		M	A				inhumation	Back, outstretched	red ochre, roebuck jawbone, horse molar, aurochs premolar, 3 smooth pebbles, 10 pierced shells, 2 flint scrapers, flint flake	Orschiedt 2013, 121
Grotta Vado All'Arancio	Italy	13,400BP			I	1.5			inhumation	Back, outstretched		Orschiedt 2013, 121
San Teodoro	Sicily	14-13,000BP	LEG	M	A					Left side	12 red deer canines	Orschiedt 2013, 121
San Teodoro	Sicily	14-13,000BP	LEG	M	A					streched		Orschiedt 2013, 121
San Teodoro	Sicily	14-13,000BP	LEG	M	A							Orschiedt 2013, 121
San Teodoro	Sicily	14-13,000BP	LEG	M	A					stretched	Cervid antler, stone cobbles	Orschiedt 2013, 121
San Teodoro	Sicily	14-13,000BP	LEG		A				Secondary burial			Orschiedt 2013, 121
San Teodoro	Sicily	14-13,000BP	LEG				skull					Orschiedt 2013, 121

San Teodoro	Sicily	14-13,000BP	LEG				skull					Orschiedt 2013, 121
Mittlere Kalusenhöhle	Germany	18,590±60BP		M	A	30-40					Red ochre	Orschiedt 2013, 122
Wilczyce	Poland	12,870±60BP			N						80 perforated arctic fox teeth	Orschiedt 2013, 122
Bonn-Oberkassel	Germany	12,180±100 BP	LM/LP	F	A						red ochre, bone pin, carving of a cervid, contour decoupé	Orschiedt 2013, 122
Bonn-Oberkassel	Germany	11,570±100 BP	LM/LP	M	A						Red ochre	Orschiedt 2013, 122
Neuwied-Irlich	Germany	11,910±70BP - 12,310±120 BP			A							Orschiedt 2013, 122-123
Newuied-Irlich	Germany	11,910±70BP - 12,310±120 BP			I							Orschiedt 2013, 122-123
Neuwied-Irlich	Germany	11,910±70BP - 12,310±120 BP			I							Orschiedt 2013, 122-123
Neuwied-Irlich	Germany	11,910±70BP - 12,310±120 BP			N							Orschiedt 2013, 122-123
Le Placard	France		B/EM		A, I			25-54	Disarticulation, defleshing			Orschiedt 2013, 123

Petersfels	Germany		M		A, I		7 fragments	several	Single cut mark			Orschiedt 2013, 123
Brillenhöhle	Germany	12,470±65BP	M		A, I		38 cranial and postcranial fragments	3 (A=2, I=1)	Disarticulation, cleaning, defleshing			Orschiedt 2013, 123
Burghöhle Dietfurt	Germany	12,309±242 calBC / 12,705±336 calBC	M				occipital maxilla, four phallanges		Disarticulation, cleaning			Orschiedt 2013, 124
Gough's cave	UK	12,600 - 12,500BP			A, I			5 (A=4, I=1)	Defleshing, dismembering			Orschiedt 2013, 125
Maszycka cave	Poland	15,015±50BP - 15,115±60BP	M		A, I		50 elements, various	9-16	Scalping, cutmarks			Orschiedt 2013, 125
Koněprusy cave	Czech Republic	12,870±70BP										Orschiedt 2013, 126
Kůlna cave	Czech Republic		LM				teeth, mandible fragments					Orschiedt 2013, 126
El Mirón	Spain	15,740±40BP / 17,032±225 CalBC	LM		A			1			Red ochre, large engraved block	Orschiedt 2013, 126
Rochereil	France	11,250±50BP	LP		I		skull					Orschiedt 2013, 127

Roc-de-Cave												Orschiedt 2013,
Grotte Rochefort												Orschiedt 2013,

Table 4.b. showing a summary of Magdalenian mortuary practice from Europe. Data derivded from Orschiedt 2013 and Pettitt 2011. Image: author.

Figure 4.3.

[redacted]

Figure 4.3. showing human remains from Gough's cave, with the skull cup in the top left. The skull has been modified by anthropogenic action to remove the base, leaving only the calotte. Image courtesy of the Natural History Museum.

fragmentary remains of the rest of the body (Orschiedt 2002; fig 4.4.). These varied traces of the working of human bones into items may have been part of a Magdalenian cosmology, forging connections between the dead and the living through the enchaining connections that objects can produce (Orschiedt 2013, 127). These traces also provide interesting connections to artistic

Figure 4.4.

[redacted]

Figure 4.4. showing the remains of a human from Brillenhöhle, Germany. The remains have been subject to careful defleshing and it is probable that the skull cap was used as a container for the other bones. Not all bones were recovered, perhaps suggesting transport and secondary treatment of the bones. Image after Orschiedt (2002, 15).

traditions in the Magdalenian, the bones being used in a similar way to rondelles and other portable art, perhaps suggesting a linkage between the function of one and the other (Orschiedt 2013, 127; Pettitt 2011, 225). A further link between artistic traditions and mortuary practice stems from their co-occurrence in some instances. Pettitt (2009) has discussed the possible connection between human depiction in art, such as figurines, and a possible connection to mortuary treatment. The discovery of the 'red lady' of El Mirón, Spain, dating to 19,020-18,858 cal BP (95.4% confidence), is another example (Straus *et al* 2011). Here a single burial had been positioned behind a large stone block, positioned via a natural rockfall, that has been the subject of engraving and painting with ochre (González-Morales and Straus 2015; Straus *et al* 2011; Straus *et al* 2015).

4.3.7. Health

The skeleton can reveal some aspects of health within the Magdalenian, linking to patterns of care and violence, but also diet and the ramifications of dietary choice, highlighting the interconnectivity of the Magdalenian world. The pathological record demonstrates the presence of both inherited conditions and conditions acquired during life. Perhaps the clearest example of the former is Romito 2 discussed above, a 17 year probable male (compare Frayer *et al* 1987 and Frayer *et al* 1988 with Craig *et al* 2010) found as part of a double burial from the site of Grotta del Romito, Italy, dating to around 13,275-12,730 cal BP (95.4% confidence) (Frayer *et al* 1987, 60). This individual was born with acromesomelic dysplasia, a type of dwarfism, attaining an adult stature of 100-130cm with further growth unlikely (Frayer *et al* 1987, 61; Frayer *et al* 1988, 551, 559). As this condition is rare and the genes are recessive, this has been used to suggest some measure of inbreeding in communities during the Magdalenian (Frayer *et al* 1987, 61; Frayer *et al* 1988, 563). This contrasts with the material culture record, which suggests aggregations and long distance connections.

There is also evidence for conditions acquired in life, which can shed light on behaviour. For example, Villabruna 1, a robust, *c.* 25-year-old male found buried at the rockshelter site of Villabruna, Italy, dating to 16,815-16,410 cal BP (95.4% confidence) – 17,856-17531 cal BP (95.4% confidence), shows signs of trauma related to a rugged lifestyle, with robust muscle attachments in the limbs, a lower back stress fracture, tibial periostitis and bilateral bipartite acromion (Vercellotti *et al* 2010, 359-360). Despite being healthy, Villabruna 1 also showed signs of porotic hyperostosis, a type of anaemia, which had left visible traces of porosity to the skull, and was likely caused as a result of an infestation of parasites acquired through the consumption of contaminated food, possibly fish (Vercellotti *et al* 2010, 364-365; fig 4.5.).

BG2, a robust and heavily muscled adult male from the site of Barma Grande, Italy, and of a likely Epigravettian date, shows signs of pathology generated through habitual activity (Churchill and Formicola 1997, 18). BG2 showed a marked asymmetry in the right and left arm and shoulder, with heavy loading and marked robusticity in the right arm (Churchill and Formicola 1997, 28). BG2 was compared against a modern sample of tennis players, known for bilateral asymmetry, and far outstripped the pattern observed in this sample, as well as Palaeolithic comparisons (Churchill and Formicola 1997, 28). His asymmetry may have been magnified by some atrophy of the left arm but no obvious sign of trauma was present, possibly indicating soft tissue pathology (Churchill and Formicola 1997, 36-37). It is probable that this asymmetry occurred as a result of frequent throwing activity in the right arm, perhaps a result of the habitual use of a spear thrower (Churchill and Formicola 1997, 19).

Figure 4.5.

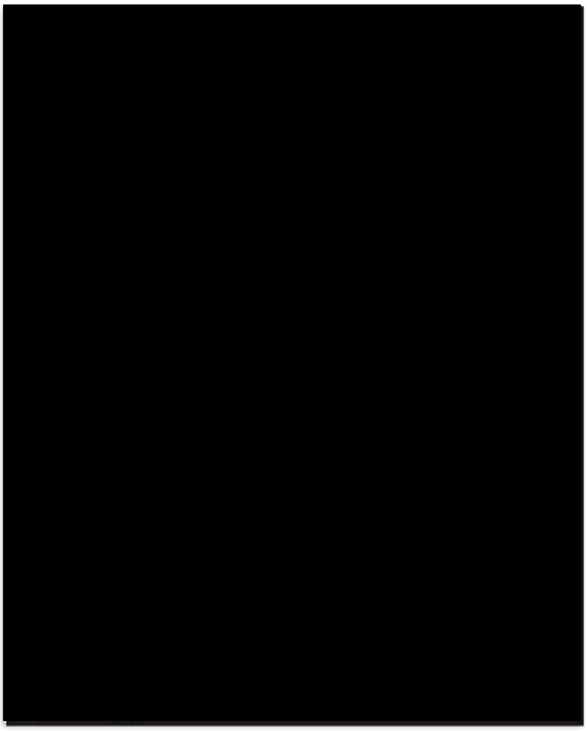

Figure 4.5. showing the skull of Villabruna 1, who suffered from numeorus ailments in life, including porotic hyperostosis, as evidence in the image by the symmetrical pattern of porosity to the back of the skull. Image after Vercellotti *et al* (2010, 360).

The Magdalenian lifeway evidently posed risks and stresses for humans, through activities undertaken and diet consumed. However, the state of health can broadly be described as good and with evidence for care during periods of ill health. Pathologies that might indicate dietary stress during life, such as Harris lines on the teeth indicating periods of arrested development, are not widely reported in the Magdalenian literature. Of those human remains listed in table 4.b., pathological specimens are in the minority.

4.3.8. Diet

The Magdalenian diet can be assessed in several ways, primarily via assessment of faunal and floral remains found in association with a site, and especially those which shows signs of anthropogenic modification (Enloe 2010, 14). This has been increasingly supported by isotopic analysis (e.g. Craig *et al* 2010; Drucker and Henry-Gambier 2005; García-González *et al* 2015; Richards *et al* 2005; Richards *et al* 2000; Stevens *et al* 2010), with the specific isotopic signature of a person or community reflecting the plants and animals consumed. Tooth wear, with different types of food leaving different patters of attrition on the teeth (e.g. El Zaatari and Hublin 2014; García-González *et al* 2015), and dental calculus, with foodstuffs trapped within the teeth reflecting consumption practices (e.g. Power *et al* 2015), have also started to be used to augment these techniques. Some further indirect evidence can be taken from the technology present at a site, with the presence/absence of particular categories of tools, such as fishhooks, giving an indicator of targeted foods and associated acquisition strategies.

Taken together, these traces paint a complex picture of Magdalenian diet. There is strong evidence for specialisation at some sites, with reindeer featuring as a significant animal to hunt during the autumn at their peak condition in some regions. For example, the site of Verberie, France, dating to 15,700 – 13,900 years ago, is a high resolution, well preserved site which preserves in exceptional detail the specialised hunting of reindeer, their killing and primary butchery (Enloe and Audouze 2010, 15). High resolution living surfaces have been excavated, revealing negative spaces interpreted as structures (Enloe and Audouze 2010, 19), heated non-local pieces of stone associated with hearths (Dumarçay and Caron 2010), stone tools consistent with scraping (end-scrapers), grooving (burins) the making of points (backed bladelets) and piercers (micro-perçoirs) (Audouze 2010), and a faunal assemblage heavily dominated by reindeer, with 16,000 elements representing a minimum number of individuals (MNI) of 130 (Enloe 2010, 23-24). The site of Pincevent, Paris Basin, France, contemporary with Verberie, is similarly well preserved and demonstrates a similar pattern of specialised reindeer exploitation. The site differs in that reindeer was likely transported to Pincevent, evidenced by the lack of vertebrae and similar elements that would not be transported from a kill site, reflecting the reduction of weight (Enloe 2010, 35), highlighting variation and the importance of context in even closely related sites.

There is also dietary diversity in the Magdalenian. The faunal record from Magdalenian sites reflects a diverse range of species exploited from a number of broad categories, including fish (e.g. Adán *et al* 2009), ungulates (e.g. Rillardon and Brugal 2014), small game (e.g. Rillardon and Brugal 2014), birds (e.g. Laroulandie 2004), marine mollusks (e.g. Rillardon and Brugal 2014) and even whale meat sourced from stranded animals (Álvarez-Fernández *et al* 2014). Many of these animals were also exploited for their secondary products, including skins, bones, and antlers and teeth, examples of which are considered in the *things* section below. Based on patterns of tooth wear, the Magdalenian diet may have been more diverse than that seen in the preceding Gravettian and Aurignacian periods (el Zaatari and Hublin, 2014), though there was no doubt regional and temporal differences within each.

Isotopic studies have finessed this picture and revealed a difference between the fauna from a specific site and the dietary signature of the humans from that same site. The human remains from Gough's cave and from Paris-Saint-Germaine-la-Rivière for example both show a disparity between the dominant fauna, horse and saiga respectively, showing a more diverse diet (Stevens *et al* 2010). This suggests that people were mobile and drawing from a range of dietary sources from different sites (Stevens *et al* 2010). Again, this seems to support a model of variable diet and exploitation, with any given site likely reflecting local exploitation and local availability. An analysis of fauna from a site will not in itself reveal the prevailing diet of the people who inhabited the site. Instead it will reflect the local availability of fauna that were exploitable. Even on specialised sites, a more diverse diet can be anticipated in the Magdalenian.

The emphasis on fauna does not necessarily reflect a lack of exploitation of floral products, though the range of options may have been limited by what was largely a cold and hostile environment. Rather, the lack of evidence is likely more indicative of poor preservation, considered further in the section on *things* below. Some work has been done in trying to reconstruct elements of floral diet indirectly through the assessment of plant depictions (Tyldesley and Bahn 1983), though plants are an uncommon subject matter. Further, isotopic and tooth wear analysis may reveal something of the floral component of the diet, or alternatively demonstrate a genuine absence if plant foods did not feature heavily. Evidently, the dietary link to animals in the Magdalenian was strong and the capacity to successfully hunt or otherwise acquire prey items was a significant factor in survival.

4.4. Animals

There was likely a strong ontological overlap between animals and humans in the Magdalenian world (Fuentes 2016, 2). Hunting relies on understanding the animal *umwelt*, the animal's perceptual understanding and negotiation of its world (Saslow 2002, 210). Humans can also be said to occupy an umwelt, which shapes our understanding of the world. This can lead to an undervaluing of the capacities of animals, which understand and interact with the world in unique and complex ways quite dissimilar to humans, especially in the contemporary world where relationships are less intimate and direct (Saslow 2002, 210). For example, humans tend to overemphasise vision because we are a visual species with highly developed depth perception and colour sensitivity (Saslow 2002, 212). The human umwelt may overlap more with fellow carnivores, such as dogs, relative to herbivores, and so it may be more challenging to understand the perceptions of some animals than others (Saslow 2002, 212). Developing an insight into Magdalenian animals enhances understandings of Magdalenian humans, the two being closely entwined and mutually constituting. The understanding of these animal umwelts through ethnology can offer some insight into Magdalenian humans, who had to be closely attuned to the animals with which they interacted to ensure hunting success and continued survival.

Approaching the animals of the Magdalenian steppe environment poses unique challenges. The environmental and ecological setting which allowed for large herds of medium to large sized ungulates to roam Europe no longer exists and no environment on earth today is of a sufficient likeness to act as a clear and direct analogy. Furthermore, while some of the key species that populated the mammoth steppe persist in some form in the present, including horse, bison and reindeer, they are of a different, if often closely related, species living in a different environmental and ecological regime, often affected by human intervention. Research has correspondingly focused on the assessment of the animal skeleton as it provides a direct route to explore how ancient animals lived. This has been pursued via diverse routeways, such as the assessment of isotopic signature to assess diet (e.g. Bocherens *et al* 2011; Drucker *et al* 2012; Drucker *et al* 2011; Garcia-Guixè *et al* 2009; Stevens *et al* 2014; Stevens *et al* 2008; Stevens *et al* 2009), DNA to assess gene flow and population range and movement (e.g. Meiri *et al* 2013) or skeletal anatomical structure to assess size, morphology and lifestyle (e.g. Guthrie 2005; 2006).

More difficult to assess is the behaviour of a particular extinct species. This has been given less attention, in part due to its difficulty, but perhaps also because it is perceived to be of less direct interest. Models often start after the hunt has already happened, based on the fauna that has been successfully collected at a site. The success of the hunt, the dominance of the human, can be assumed by their very presence. But this approach acts to inadvertently curtail a deeper, nuanced understanding of human/animal relationships in the Magdalenian. To hunt powerful, alert and dangerous animals, hunters rely on a deep ecological knowledge, a sense of how an animal will behave in a given situation (Lott 2003). Hunting strategy is invariably linked to the behaviour of the animal being hunted rather than solely the imposition of human will onto a passive animal populace: human/animal relationships in the Magdalenian were more than a story of passive, mindless animals waiting to be killed and instead was a series of mutually constituting relationships. In this more intimate account of key species in the Magdalenian, analogy is made with species that have persisted into the present and how they understand their world to inspire a more nuanced understanding of animals in the Magdalenian. This is far from an exhaustive review of the animals of the mammoth steppe. Instead, focus rests on several selected species: Reindeer, horse, bison, and dogs. These species are selected not only because of their economic important to humans, but also for what they can communicate about Magdalenian art. These species will be revisited in the discussion of Magdalenian art below, shaped by insights derived form the discussion that follows. The consideration of each species brings together insights from the archaeological and ethnological records, unpacking physical and behavioural details of the animal based on contemporary data, enriching the understanding of how the human/animal relationship might have been negotiated in the Magdalenian.

4.4.1. Reindeer

Reindeer (fig 4.6.) was a central species in the Magdalenian lifeway. Reindeer and other animals were subject to the same pressures as humans during the LGM and similarly retreated into southerly refugia (Banks *et al* 2008, 2569). The age and sex profile of reindeer from a site may give some indication of the type of archaeological exploitation of reindeer. Weinstock (2002, 371) has identified that there was not a single Magdalenian hunting strategy in relation to reindeer, and that the age and sex profile correlates with the hunting strategy used. Intercept hunting provides an indiscriminate pattern, for example (Weinstock 2002, 371). Weinstock (2002, 374) identified at least two types of hunting

Figure 4.6.

Figure 4.6. showing an example of a young reindeer. Image courtesy of Wikimedia commons.

strategy: a non-discriminatory strategy and another that gave a heavier female signature with a significant male contribution (Weinstock 2002, 374). There was variety in sub-populations of reindeer during the Upper Palaeolithic. The remains from Biśnik cave, Poland, dating across MIS3 and MIS2, shows a probable tundra variant of reindeer, larger than remains found in Germany but smaller than sites from eastern Europe, with distinct antler and tooth shape, the latter reflecting local environmental conditions and dietary adaptations to lichen and hard foods (Piskorska *et al* 2015). Regional populations have also been identified in western Europe, based on animal size, with different migration strategies that encouraged different types of hunting patterns (Kuntz and Costamagno 2011). Longer distance north/south migrations of reindeer have been identified to the north of France, encouraging a seasonal mass kill strategy, reflected in sites such as Pincevent and Verberie (Kuntz and Costamagno 2011, 12). No such similar pattern has been identified to the south, where mass kills and long distance migration is not in evidence (Kuntz and Costamagno 2011, 12). To the south, including Montastruc and surrounding sites, animals likely migrated over a shorter distance, likely along a west/east axis, likely acquired via an optimal processing strategy of kills (Kuntz and Costamagno 2011, 15). The season of exploitation was much more variable from region to region, suggesting shorter migrations and the killing of individuals or small groups rather than mass kills from large seasonal aggregations (Kuntz and Costamagno 2011, 19, 21). The site types in the south were likely different, reflecting habitation sites rather than kills sites seen in the north (Kuntz and Costamagno 2011, 22).

Observed reindeer body size can vary widely, ranging from as little as 77kg to as large as 180kg and 120cm at the shoulder, with larger animals typically found in forested environments and smaller animals in open tundra environments (Burch 1972, 342; Smith 2006, 8). The reindeer musculoskeletal anatomy is adapted to long distance movement and travel over rough ground. The dew claw contacts the ground during movement to give a larger surface area to the foot, also allowing for effective swimming and greater endurance activity, supported by a high oxidative capacity in skeletal muscle fibres (Burch 1972, 342; Wareing *et al* 2011, 1572). Reindeer can move rapidly, with walking pace at 7km/hr, a fast walk at 10km/hr, a trot at up to 40km/hr and a gallop at up to 70-80km/hr (Burch 1972, 345). Maximum daily movement rates recorded for Canadian caribou averaged 25-30km, with an annual round of 2400km; it is unlikely that humans could follow herds all year round at this rate of movement (Burch 1972, 345). This figure would be subject to variability, linked to environmental and ecological circumstance. While reindeer are characterised as a species that seasonally migrate over vast distances following predictable routes, the seasonal migration can be much more variable, linked to environmental circumstance (Wareing *et al* 2011, 1571). High mobility might encourage an exploitation pattern of seasonal ambush along semi-predictable migration routes, exploiting animals at peak condition (Burch 1972, 346).

Reindeer have complex calls that can be recognised to the individual (Espmark 1974). This is essential to mother/infant bonding and recognition where each calf call is sufficiently different to render it unique relative to any other calf (Espmark 1974, 54). This is also the same for red deer and likely reflects an adaptation to cervids generally (Vaňková and Málek 1997, 288). Vocalisation was likely significant within human/reindeer relations, offering insight into age, sex, health, behavioural status and intention, and location. When magnified by a herd, listening for calls was likely among the primary initial strategies in locating animals in the environment.

Antlers are present in males and females, a unique adaptation amongst cervids (Melnycky *et al* 2013, 1372; Suttie and Webster 1995, 104). Antlers are unique: their annual growing, casting and re-growing cycle represents an unparalleled case of bone regeneration in mammalia (Kierdorf *et al* 2009, 535, 539). Reindeer antler has a high ratio of compact to spongy tissue (Lefebvre *et al* 2016, 3) and the antlers of both males and females are of a similar composition despite being used in different ways in life, for the rut in males and for defence of food resources during winter months in females (Melnycky *et al* 2013, 1372; Shah *et al* 2008). Antlers are large and morphologically complex compared to other cervid species and are highly variable between individuals (Espmark 1963, 159; Smith 2006, 12). Antler size correlates with breeding success in males, as well as body size, suggesting antlers are a secondary sexual characteristic in reindeer (Melnycky *et al* 2013, 1375). Antler was a highly prized secondary product in reindeer and formed the basis of much of the technology produced by Magdalenian humans, with both shed and antlers from kill being used. Their shedding and regrowth might have been construed as significant within animal-human relationships, given its unique character in the animal kingdom and importance to humans as a resource.

The behaviour and physical quality of reindeer varies by season. Aggression between males increases during the autumn rut due to competition over breeding rights. This aggression can overflow to members of the harem due to over-arousal (Espmark 1963, 161). Copulation often occurs towards the end of September (Espmark 1963, 162). Male condition reduces rapidly during the rut, with males failing to feed and focussing entirely on competing for mating rights leading to high rates of attrition during the winter (Smith 2006, 31; Weinstock 2002, 366). Body weight correspondingly fluctuates by season, with peak condition reached in the autumn around the time of the rut, depleting rapidly after the rut, especially in males, through into the spring (Burch 1972, 342). The autumn is also the peak season for the skin of the animal and would be a key period for human exploitation (Burch 1972, 343). As discussed above, a seasonal strategy of exploitation might be linked to an appreciation of when an animal was in prime condition, marked by its own behaviour during the rut.

Reindeer response to threat varies by season, perhaps encouraging the modification of the strategy employed in hunting them. Reindeer will often flee up slope and into the wind to be able to detect any oncoming threats during escape before they are encountered (Reimers *et al* 2005, 408, 410). Any hunting strategy would have to take such specific animal behaviour into account to increase the likelihood of success. During the rut in autumn when reindeer group size is significantly larger, individual animal arousal to threat is reduced, with the tendency to flee occurring at a closer distance (Reimers *et al* 2005, 404). In winter when reindeer are more solitary or live in smaller groups, individual animal alertness and response to threat is heightened; reindeer will flee when a threat is at a greater distance (Reimers *et al* 2005, 409). The strategy for reindeer exploitation might well vary by season and again a targeted strategy during the season of least arousal to human presence would be during the autumn rut.

4.4.2. Horses

Horses were a significant species in the Magdalenian (Guthrie 2006). Economically, they were an important source of meat, skins and materials. This can be evidenced at sites such as Gönnersdorf and Andernach-Martinsburg, Germany, dating to *c.* 13,000 cal BP (Stevens *et al* 2009; Street *et al* 2012, 234, 240), Oelknitz, Germany, dating to 15,436-14,449 cal BP (95.4% confidence) – 15,615-14,763 cal BP (95.4% confidence) (Gaudzinski-Windheuser 2012, 165, 167), and Gough's cave, England, dating to *c.* 15,027-14,471 cal BP (95.4% confidence) (Stevens *et al* 2010, 59), where there is a significant focus on the exploitation of horses, and isotopic analysis of humans has confirmed the importance of ungulates in the diet (Drucker and Henry-Gambier 2005). Horses are one of the most common species to be depicted in Palaeolithic art, perhaps reflecting their importance (Guthrie 2005, 61). As already discussed, the mortuary record suggested a special focus on the human head in the Magdalenian. There are parallels in the use of animal skulls for art, especially horse. Birouste *et al* (2015) raise the possibility that there was a focus on working and decorating the mandible of horses, noting a pattern of adorning animal parts associated with distinctive actions characteristic of the species (Birouste *et al* 2015, 12). The decorated horse mandible from Kendrick's cave (fig 4.7.) is one such example where the mandible has been subject to detailed decoration.

Perhaps the closest living horse species to the extinct Palaeolithic horse is the Przewalski's type (fig. 4.8.), on the grounds that they are a wild, arid steppe species (Guthrie 2006, 72; van Dierendonck *et al* 1996, 96). As such, they make the most appropriate analogue for Palaeolithic horses of extant horse species. Distinguishing features of Przewalski's horse include short legs, a stocky body and a large head, with thicker legs and a shorter gait than domestic horses (Sasaki *et al* 1999, 403, 407). They are distinct from domestic horses, with 66 chromosomes compared to the 64 of domestic horses, though they can produce viable offspring (Alberghina *et al* 2016, 71). However, domestic horses and Przewalski's horses are

Figure 4.7.

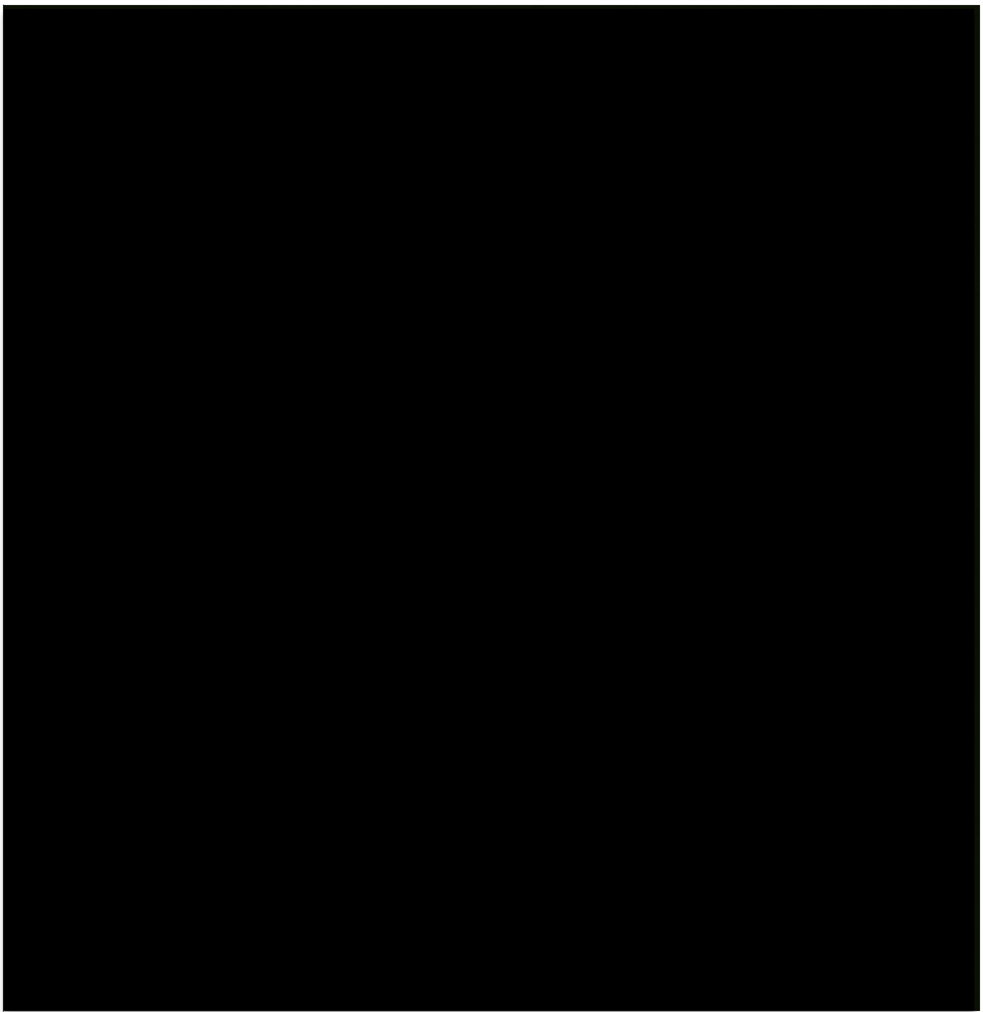

Figure 4.7. showing a decorated horse mandible from Kendrick's cave, Wales. Image courtesy of the British Museum.

genetically more closely related to each other than to Pleistocene horses (Alberghina *et al* 2016, 71). There are distinct personalities and behaviours by breed of horse, (Hausberger *et al* 2008, 6; Lloyd *et al* 2008) making a direct comparison challenging. For example, the transition to domesticity and human selective breeding has likely removed much of the natural dominance behaviour of horses (Lloyd et al 2008, 378). The Przewalski's horse was extinct in the wild before being reintroduced into parts of the Mongolian steppe via zoo programmes (Alberghina *et al* 2016, 71; van Dierendonck *et al* 1996, 96) and zoo enclosures are known to modify behaviour, from increased pacing and aggression, to disturbances linked to enclosure size and ambient noise levels, compromising behavioural observations for wild settings (Boyd 1988). There are no records of their behaviour before their wild extinction (Boyd 1991, 302). Much of the following is based on information for this closely related wild horse variant.

Figure 4.8.

[redacted]

Figure 4.8. showing example Przewalsi's horses. Image courtesy of Wikimedia commons.

How horses perceive the world and organise themselves socially might well have shaped the human/horse relationship and exploitation strategies (Guthrie 2006, 76). Olfactory and auditory perception is sophisticated in horses and is more important than vision (Saslow 2002, 212). Jacobsen's organ, for example, is a specialised organ that can detect smell through a flehmen response, the curling of the lip with an inhalation of air, drawing particles into the vomeronasal organ (Saslow 2002, 212-213). Smell and hearing are equally effective in day or night conditions, marking a distinct advantage over a reliance on vision (Saslow 2002, 213). The shifting of the ears in horses can be an indicator of its shifting attention, the direction in which they point reflecting the active attention of the horse (Saslow 2002, 217). They also possess a far superior capacity to hear higher frequencies than humans (Saslow 2002, 218). Horse vision is relatively poor by contrast, perhaps akin to human peripheral vision, and is geared towards the detection of movement (Saslow 2002, 220-221). The eyes being positioned to the side of the head enhance this, though at the cost of only a very limited field of binocular vision (Saslow 2002, 220-221). The presence of a tapetum, which reflects light within the eye, and the large size of the eyes result in horse vision being optimal in low light conditions (Saslow 2002, 221). Vocalisations in horses can convey significant information to others and are specific to the individual (Alberghina *et al* 2016, 71). Horses produce a complex range of vocalisations, including nickers during courtship and squeals during antagonistic display (Alberghina *et al* 2016, 72). It seems probable that human sensitivity to these capacities and cues would facilitate hunting success.

Horse behavioral adaptions might similarly have shaped human strategies for horse exploitation. Time budgets have been calculated for Przewalski's horses, and while these often pertain to behaviour in captive conditions (e.g. Boyd 1988; Boyd *et al* 1988), increasing work has been conducted on released populations in Mongolia (e.g. van Dierendonck *et al* 1996, 100), perhaps giving a truer sense of wild behaviour. Grazing, resting and moving accounts for the vast majority of the time budget of a Przewalski's horse in the wild, as much as 90% (van Dierendonck *et al* 1996, 105). Feeding time may be increased in colder environments, linked to a shorter growing season (van Dierendonck *et al* 1996, 110). Boyd (1988, 24, 31) found males were prone to engage in greater displays of aggression than females, while females engaged in higher rates of self-grooming and mutual-grooming (Boyd 1988, 24, 31). This behavioural difference can in males be heightened during the rut. Breeding season falls between May and early July (Boyd 1988, 23) with an eleven-month gestation, resulting in births in the late spring through to the early summer (Boyd 1991, 309). Horses possess a strong herding instinct; even lone males will form bachelor herds in wild conditions (Boyd 1988, 37; Boyd 1991, 308). Members of a herd are likely to engage in the same behaviour at the same time. Dierendonck *et al* (1996, 103) observed individual herd members synchronising behaviour with the group at least 50% of the time. They have a harem structure in the wild (Boyd *et al* 1988, 5) with stable hierarchical structure (Boyd 1991, 305). Dominance is linked to reproductive success, with dominant individuals, especially males, more likely to breed (Boyd 1991, 308).

4.4.3. Bison

Bison (fig. 4.9.) spread into Europe from Asia during the mid Pleistocene (Meagher 1986, 1). There were likely many different species of bison in the Palaeolithic, *Bison priscus* ancestral to modern forms, all marked by being of a greater stature and weight than contemporary bison (Lott 2003, 62-66; Meagher 1986 2-3). It is probable there was at least two species of bison in Europe during the Palaeolithic (Soubrier *et al* 2016), potentially with quite different behavioural repertoires. Much of what follows is based on the American Bison, *Bison bison.*

Figure 4.9.

Figure 4.9. showing an example of a European bison (wisent). Image courtesy of Wikimedia commons.

The anatomy of bison shapes interactions with humans. Bison have heavier forequarters than hindquarters, with a distinctive hump caused by heavy musculature and the extension of the neural processes of the thoracic vertebrae (Meagher 1986, 1). Males are larger than females, up to 9% for an animal of the same girth, the highest recorded weight being 1,724kg (Meagher 1986, 1). Bison have high oxygen carrying capacity, supporting their capacity for endurance running over long distances (Meagher 1986, 4). Horns are triangular in shaper in males, smaller and circular in cross section in females (Meagher 1986, 1). The hair density is high, 2,992 per cm^3 in females, giving excellent insulation against cold and wind (Meagher 1986, 4). Molting of the hair begins in late winter to early spring and the winter coat grows through by autumn, when it is in peak condition (Meagher 1986, 3). Males have a distinctive spread of fur across the shoulder and forequarters as well as thick, long fur on the head in part to absorb impact during fighting (Lott 2003, 6). Breeding occurs in the summer, usually around July to August, with calves born the following spring, typically April to May, a gestation of around 285 days (Meagher 1986, 4). Growth is rapid in calves, with yearlings attaining weights of 225-315kg, and full body size reached by age 3 in females and age 5 in males (Meagher 1986, 5). While sexual maturity is reached after the first year, successful breeding is more typical around the age of 2-4 years (Meagher 1986, 4). Average life expectancy falls between 12 and 15 years, though some animals as old as

40 years have been recorded (Meagher 1986, 5), with life perhaps artificially extended as a result of human management and intervention.

The behaviour of bison shapes the nature of interactions with humans. The diet consists almost completely of grasses and sedges (Meagher 1986, 5). Bison are ruminants, with 4 digestive compartments and the periodic regurgitation of cuds to facilitate digestion (Meagher 1986, 4). During heavy snow cover, the head and neck are used in a swinging motion to clear snow to facilitate foraging (Meagher 1986, 4). Bison migrate seasonally, with well-established travel routes, with specific distances ranging by ecological setting. Recorded distances range from 14-40km in montane regions and as much as 240km in parkland habitats (Meagher 1986, 5). Bison can range several km per day while ranging for food (Meagher 1986, 5). Bison are a herding species, with group size increasing during the rut and/or in open habitats (Meagher 1986, 6). The natural predator of the bison is the wolf, with calves the most frequent target of attacks (Lott 2003, 75, 99-104; Meagher 1986, 6). Bison are capable of running over long distances, swimming with competence, and running at speed for short durations, as much as 60 km/h (Meagher 1986, 6).

Bison demonstrate male dominance and female polygyny, with dominant males guarding females from other males during the rut to ensure copulation (Wyman *et al* 2012, 1382). Bison vocalisations are unique to the specific individual animal (Wyman et al 2008, 1630) and a male bison call can carry for up to 5km (Meagher 1986, 6). Antagonistic display between males can involve bellowing, parallel walking, pawing, charging and fighting (Wyman *et al* 2012, 1383). Especially during the rut, male bison communicate information with their vocalisations, accurately communicating body size, dominance status and mating success, individual identity, species gender and motivational state (Wyman *et al* 2008, 1626; Wyman *et al* 2012, 1382, 1386). Fighting takes place with animals head to head, with repeated movements of a low slung head rising sharply, using the horns, which points upwards in bison, as a weapon (Lott 2003, 10; Wyman *et al* 2008, 1627). Most displays do not lead to physical aggression and lethal injury is rare (Lott 2003, 6). Threat displays are usually performed head on or standing parallel to one another (Lott 2003, 10-11). During antagonistic display, dominance and subordination is established via the loser of the display turning the body away from the dominant victor, head low and silent (Lott 2003, 11; Wyman *et al* 2012, 1383). Males are heavily depleted during the rut, losing 10-15% of body weight, failing to feed and focussing entirely on breeding, leading to high attrition in winter months (Lott 2003, 12, 20). Older males are typically more aggressive than younger males, likely because they risk less in aggressive encounters due to the limited lifespan remaining relative to younger bulls (Lott 2003, 13). A dominance hierarchy exists amongst females, which is mediated through antagonistic display, with dominant females being heavier as a result of increased access to better quality graze. This dominance carries with it the advantage of increased successful pregnancies and increased calf weights (Lott 2003, 24; Wyman *et al* 2012, 1387).

How bison perceived their world might have shaped human/bison interactions in the Magdalenian. Bison are a primarily auditory and olfactory species, with strong hearing and smell, and a well developed flehmen response in males, as discussed for horses (Meagher 1986, 6). This response is often used to assess the status of female fertility by testing urine (Lott 2003, 15). Females will often run through the herd, numerous bulls chasing, which often results in the attraction of a higher ranking bull, to which cows are typically more receptive (Lott 2003, 16-17). Bison can distinguish large forms from up to 1km and moving forms from up to 2km away (Meagher 1986, 6), perhaps shaping how they might be hunted.

4.4.4. Dogs

Dogs (fig 4.10.) may have played a critical role in human success in Palaeolithic Europe, providing a significant advantage during hunting (Shipman 2015b). Relationships with animals could be complex and the dog is perhaps the best example of a deep intertwining of human and animal in the Palaeolithic (Germonpré *et al* 2012, 199-200). While the exact timing remains a point of heavy debate, dogs were likely the first domesticated species (Grimm 2015, 274), perhaps as early as the Aurignacian based on fossils from Goyet, Belgium, dating to *c.* 35,862-35-338 cal BP (95.4% confidence) (Germonpré *et al* 2009, 481). These early dogs would have been all but genetically identical to populations of grey wolves at this time, only adding to the challenge in their recognition (Germonpré et al 2009, 485). They might have become domesticated via an increasing association with human occupation sites, feeding on refuse (Boudadi-Maligne and Escarguel 2014, 80; Grimm 2015, 277), self-selecting for animals less fearful of human contact, eventually leading to tame animals susceptible to domestication, likely over a short timescale (Morey and Jeger 2015, 424, 426).

Figure 4.10.

[redacted]

Figure 4.10. showing an example grey wolf. Early dogs would likely have shared many attributes with grey wolves, from which they derive, giving a clearer sense of their likely anatomy and appearance than contemporary dog breeds. Image courtesy of Wikimedia commons.

Figure 4.11.

[redacted]

Figure 4.11. showing a map of late Upper Palaeolithic dog distribution. Image after Morey and Jeger (2015, 423).

Dogs were an important species in the Magdalenian, a period by which dogs were likely fully domesticated (e.g. Boudadi-Maligne and Escarguel 2014; Lee *et al* 2015; Germonpré *et*

Table 4.c.

Site	Location	Date	Reference
Pont d'Ambon	France	16405-16,105 cal BP (95.4% confidence) – 12,935-12,775 cal BP (90.4% confidence)	Morey and Jeger 2015, 424
Bonn-Oberkassel	Germany	17,164-16,817 cal BP (95.4% confidence)	Morey and Jeger 2015, 424
Kesslerloch Cave	Switzerland	17,570-17,272 cal BP (95.4% confidence)	Morey and Jeger 2015, 424
Le Morin	France	17,940-17,646 cal BP (95.4% confidence)	Morey and Jeger 2015, 424
Le Closeau	France	18,357-18,079 cal BP (95.4% confidence) - 17,164-16,817 cal BP (95.4% confidence)	Morey and Jeger 2015, 424
Montespan	France	18,835-18,668 cal BP (95.4% confidence) – 16,405-16,105 cal BP (95.4% confidence)	Morey and Jeger 2015, 424
Mezin	Ukraine	18,357-18,079 cal BP (95.4% confidence)	Morey and Jeger 2015, 424
Mezhirich	Ukraine	18,357-18,079 cal BP (95.4% confidence)	Morey and Jeger 2015, 424
Kniegrotte	Germany	19,470-19,182 cal BP (95.4% confidence)	Morey and Jeger 2015, 424

Table 4.c. showing likely cases of dogs dating to the Magdlaenian. Data derived from Morey and Jeger (2015, 424).

al 2009; Germonpré *et al* 2012; Germonpré *et al* 2013; Grimm 2015; Morey 2006; Morey and Jeger 2015; Shipman 2009; 2015; though see Drake *et al* 2015 for a contrasting view). Table 4.c. and figure 4.11. plot and detail all of the known dog remains across Europe.

Further robust evidence comes from the Gravettian site of Předmostí, Czech Republic, dating to 30,625-29,942 cal BP (95.4% confidence) – 31,203-30,891 cal BP (95.4% confidence), where a possible dog was found buried with a piece of bone placed in its mouth, with further examples showing tooth crowding, both indicative of a link to domestication (Germonpré *et al* 2012, 185, 190; figure 4.12.). These early specimens all point to animals of a similar size to wolves, around 60-90cm at the shoulder and a mean weight of 35kg, which may have reduced through time with protracted domestication to around 30-45cm at the shoulder in the Magdalenian and later periods (Germonpré *et al* 2012, 197-198). Ethnographically, animals of this size have been shown to offer a wide range of utility, protecting humans from predators (Fiedel 2005, 18), aiding in the hunt to track, corral and tire game (Germonpré *et al* 2009, 482; Fiedel 2005, 13; Shipman 2015a, 43, 44), acting as beasts of burden to transport objects (Fiedel 2005, 14; Germonpré *et al* 2009, 482; Germonpré *et al* 2012; 198; Grimm 2015, 277), as a mode of transport in dog teams using sleds (Fiedel 2005; Germonpré *et al* 2012, 198), and as a source of starvation food during times of hardship (Fiedel 2005, 16). Their role as companion animal cannot be discounted given the prominence of this practice within contemporary hunting and gathering communities and beyond (Serpell 1987).

Figure 4.12.

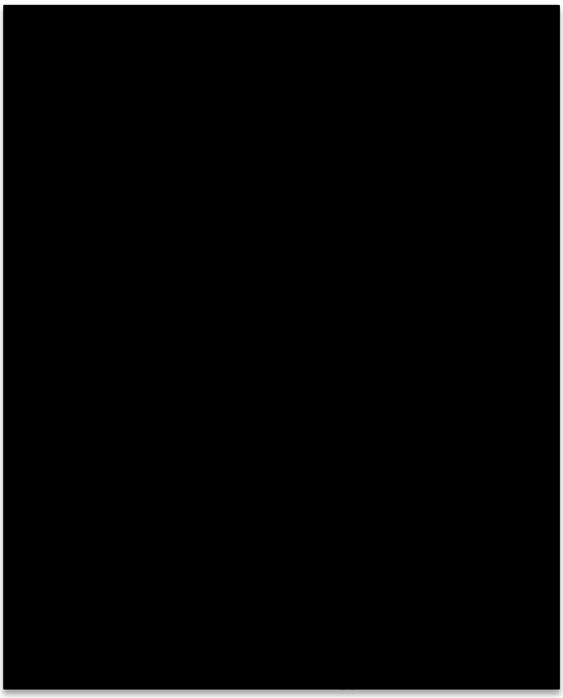

Figure 4.12. showing a dog skull from Předmostí with a piece of bone inserted into the mouth. Image after Germonprê *et al* 2012, 191.

The domestication of wolves can be seen to reflect a broader pattern of deep and intimate ties to the broader suite of animals in the landscape. There is support for this close relationship from sites such as Saint-Germaine-la-Rivière, dating to the Middle Magdalenian, where dogs were sharing a diet with humans (Germonpré *et al* 2009, 488), suggesting a shared lifeway. The role of dogs in art is also enlightening, as they are rarely depicted in art, much in the same way as humans both feature only rarely in artistic depiction, with the Font-de-Gaume, France, dating to around 17,000 years ago, being perhaps one of the clearest (Shipman 2009, 287). Canid teeth were frequently perforated and used as ornaments, even on sites where dog remains were a minor component of a faunal assemblage (Shipman 2009, 288-289). This highlights a lack of clear division between animals and things, with parts of dogs valued not only because it was a useful material but also because it derived from a dog, reminiscent of Conneller's (2004) animal-objects. Dogs held a special place in the Magdalenian and are a clear example of the complex relationships between humans and animals in this period.

4.5. Things

Things are essential to the Magdalenian lifeway. Particular types of material culture will be a prominent focus of chapter 5 and so less will be discussed in detail about specific types of material culture. Instead, some broad categories of material and how they were used will be considered. Focus is limited to: stone, bone and antler, wood, fibres and skins, and fire.

4.5.1. Stone

The use of stone largely revolved around the use of flints and cherts to make tools. Magdalenian lithic technology, regional and temporal specific variances aside, was primarily composed of unipolar and bipolar core reduction, (un)backed bladelets associated with composite projectile points, burins, endscrapers and piercers. There was likely some variance over time, for example Langlais (2011, 723) suggests that microbladelets dominated in the Lower Magdalenian, reflecting limited planning and high mobility, compared to the Middle Magdalenian where a more diversified lithic assemblage perhaps reflected corresponding changes in social structure to a more sedentary and localised strategy (Langlais 2011, 723). Some further consideration of the technological milieu can be found in chapter 5 in the consideration of Montastruc. In this regard, Montastruc can be taken as a detailed example of some of the technological themes raised here.

The manufacture and use of stone tools seems to be more than a functional process during the Late Glacial. For example, deposition of lithics in cave fissures may suggest a symbolic role for what is classically understood as a purely functional object set (Langlais 2011, 723). Similarly, the earlier Solutrean leaf points from Volgu were manufactured with great skill and are so fine and thin that they would likely smash if used as a projectile (Aubry *et al* 2008; Sinclair 1995). At least some of the Volgu cache looks to have been intentionally broken if it didn't meet a sufficiently high standard (Aubry *et al* 2008; Sinclair 1995). While this example is temporally dislocated from the Magdalenian, it serves to contextualise stone tool use and production; it doesn't seem to be an entirely functional process, and as discussed in relation to Étiollles above, differences in age, skill and status might well have played out through this and other types of material working (Pigeot 1990). Ethnographic insight adds weight to this suggestion. For example, Taçon (1991), working amongst the Australian Aborigines, notes the strong overlap between the utilisation of stone and the symbolic potency of that stone, especially played out through attributes such as colour. Taçon's work, discussed fully in chapter 3, is an important reminder that a wider suite of attributes might have been shaping human action beyond strictly functionally significant criteria, including colour, location of source, acoustic properties, presence or absence of fossils, and no doubt many more besides.

While flints and cherts were used to make stone tools, courser stones were also utilised. Blocks of stone were used in hearths and to create living floors. At the site of Gönnersdorf in Germany, for example, stone blocks lined the floor of structures (Street and Turner 2015). Stone blocks were frequently used in hearths, discussed more fully in the treatment of fire that follows. Stones were also used as supports for engraving in the form of plaquettes, discussed further in relation to art below. Natural stone features have also been exploited for their acoustic properties. Dams (1985) reports the use of stalagmites in caves, often embellished with paint, as lithophones to produce sound, possibly adding to a growing corpus of musical instruments used in the Magdalenian. Such a utilisation suggests a deep interest in the natural properties of materials, including stone, something also seen in the use of the heat fracturing of stone in hearths, where different types of stone were used for different types of task depending on their thermal properties (Dumarçay and Caron 2010).

Working with stone was of central importance in the Magdalenian lifeway. It was diverse, ranging from subsistence tasks, the pragmatic stabilisation of surfaces, the creation of heat, music, symbolic or ritual significance. Many of these stone materials appear to have taken on both pragmatic and symbolic significance. This perhaps suggests that a rigid division between these realms may be misplaced in the Magdalenian.

4.5.2. Bone, Antler and Ivory

The use of bone, antler and to a lesser extent ivory in the Magdalenian was as critical and varied as the use of stone. In the same ways as stone, many of the specific categories will be explored in greater detail in chapter 5. The sourcing of ivory may have become increasingly challenging through the Magdalenian with the waning of megafaunal species, such as woolly mammoth and woolly rhino, through time. There is some suggestion from the site of Gönnersdorf, for example, that some pieces of ivory were likely exploited in a semi-fossilised state (Street and Turner 2012, 241), reflective of localised extinction within a region. The utilisation of bone, antler and ivory variously associated with a wide range of activities. This included, but is not exclusive to the making of: barbed points, harpoons, projectile points, fish hooks, spear throwers, rondelles, musical instruments, needles, perforated batons, and art. This diversity demonstrates the range of tasks in which bone, antler and ivory technology can be implicated, permeating through the entire Magdalenian lifeway. In turn, this highlights the interconnectivity of animal and object, with the former key in the production of the latter.

Many of these tool categories are not strictly functional objects, with some acting as supports for elaborate artistic depiction. This parallels themes discussed in relation to stone tools, where a distinction between functional and non-functional may be overly rigid when discussing Magdalenian material culture. Some artistic forms are highly specific, despite being dispersed over different sites. The decoration of spear throwers is a particularly clear example. The spear thrower is an important innovation in the Magdalenian lifeway. Typically made from reindeer antler, the spear thrower acted as an extra pivot to the arm, allowing a projectile, mounted typically in a groove or to a projecting piece of bone or antler insert, to travel with considerable extra velocity (Garrod 1955; Hutchings and Brüchert 1997). This would have been a significant advantage in the hunting of game, especially medium to large ungulates, maintaining distance from the animal and increasing the likelihood of the projectile traveling to its target with lethal force. The spear thrower was also typically subject to elaborate artistic depiction, using the shape of the antler to inspire the creation of flowing animal forms. For example, a highly specific design featuring a deer fawn, with head turned over its shoulder, and bird sat on its rump (fig 4.13.) features across numerous sites spread across Europe, evidencing the interconnection between sites (Bahn and Vertut 1988, 82).

Figure 4.13.

[redacted]

Figure 4.13. showing a spear thrower from Mas d'Azil with a deer fawn and bird design. This type is highly specific but found in a wide distribution nonetheless. Image courtesy of Musée Archéologie Nationale.

The presence of musical instruments made from animal bone may provide some insight into social relationships in the Magdalenian. The tradition of musical instruments, especially pipes, stretches back to the Aurignacian and the first arrival of humans in Europe, with the earliest example known from the site of Hohle Fels, Germany, dating to around 40,000 years ago (Adler 2009; d'Errico *et al* 2003, 39). Street and Turner (2015, 16) have made the case that bird bones may have been manufactured into musical instruments at the site of Gönnersdorf, Germany, dating to 15,726-15,360 cal BP (95.4% confidence). A large collection of pipes was recovered from Isturitz, France, some of which date to the Magdalenian (d'Errico *et al* 2003, 39). Further supporting evidence can be found in the working of reindeer phalanges into whistles (Morley 2006, 57-62). Music might well have played a significant role in the bonding of social groups during the Magdalenian (Morley 2002, 212).

4.5.3. Wood, Fibres and Skins

The prospect of recovering well-preserved organics will always be slim for any Palaeolithic period. There is a notable lack of preserved wood or fibre technologies of Magdalenian age, despite probably being significant materials (Hardy 2008). As a result, the discussion of wooden and fibrous technologies is limited to the realm of indirect inference. Even if speculative, these components of the technological repertoire are worthy of consideration, based on their probable importance to the Magdalenian lifeway (Hardy 2008).

The indirect traces that can be explored as a proxy for such technology offer some useful clues about this lost part of the record. Stone (Stone 2009; 2013) has made a case for perforated batons as being associated with the working of plant fibres. This claim is based on the presence of plant residues within the perforation, supported by observations derived from the exploration of fibre technologies in ethnographic collections (Stone 2011). Soffer (2004), Soffer and Adovasio (2010) and Soffer and colleagues (*et al* 2000; *et al* 2000) have similarly championed the importance of fibre technology, variously inferring the presence of net making, weaving, rope making, and the presence of complex woven fabrics via impressions in anthropomorphic figurines. Together, these traces demonstrate a rich and diverse plant fibre working tradition, starting at least in the Gravettian.

The use of hides and hair was likely another essential technology that stands little chance of preserving. Hair might be used in the making of twine, rope or nets. Hides were likely significant in the making of clothing and the covering of structures. The faunal record indirectly supports abundant access to a wide array of skins, hides and hair, though their presence and use often has to be indirectly inferred. For example, at the site of Verberie, the working of hides was inferred by the presence of negative spaces free of lithic working debris in association with side scrapers, a tool type appropriate for hide working (Enloe 2010, 40; Keeley 2010, 232). Personal ornaments are prominent in the Magdalenian record and their distribution within burial can be used as indirect evidence for clothing, depending on distribution. For example, at the site of La Madeleine, France, dating to 12,238-11,398 cal BP (93.2% confidence), a child was found buried with hundreds of beads made from marine shell, primarily dentalium (Fig 4.14.), the distribution of which was suggestive of attachment to clothing, including a cap, bracelets, anklets and a necklace (Vanhaeren and d'Errico 2003, 495).

Despite their dearth in the archaeological record, wood, fibres, hair and skins/hides were likely essential to the Magdalenian lifeway. The limited direct evidence likely reflects a ubiquitous preservation bias against fragile organic artefacts rather than their unimportance (Hardy 2008).

4.5.4. Fire

While the Magdalenian can be described as a culture emerging and expanding during a period of environmental amelioration, the climate was still likely harsh and unforgiving, with cold winter temperatures and only modestly warm summer months (Cattin 2010, 213). As such, fire technology would have played a central role in the Magdalenian lifeway

Figure 4.14.

[redacted]

Figure 4.14. showing beads from the child burial of la Madeleine, France. Image after Vanhaeren *et al* 2014. 1483.

in everything from staying warm, socialising, cooking and technologies such as mastic preparation.

In a period when wood might be in relatively short supply, quantities varying spatio-temporally, the burning of bones was likely significant as a source of fuel and as a means of producing grease. The nature of fires and hearths produced seems to reflect the nature of the available fuel. For example, at the linked open-air sites of Monruz and Champréveyres, located on the shores of lake Neuchâtel in Switzerland and dating to 15,726-15,360 cal BP (95.4% confidence), oven-like structures made of stones were created that were used repeatedly (Cattin 2010, 215; Leesch *et al* 2010; Leesch *et al* 2012; fig 4.15.). The lack of fuel, with dwarf birch the most ready source, placed a heavy pressure on slowing the rate of burn within the hearth and the limestone block structure achieved this, as well as acting as a source of radiating heat long after the fire itself had died down (Leesch *et al* 2010; Leesch *et al* 2012). The use of stones in association with fire was a common occurrence in the Magdalenian and seems to have been a component part of an elaborate technology (e.g. Dumarçay and Caron 2010).

Figure 4.15.

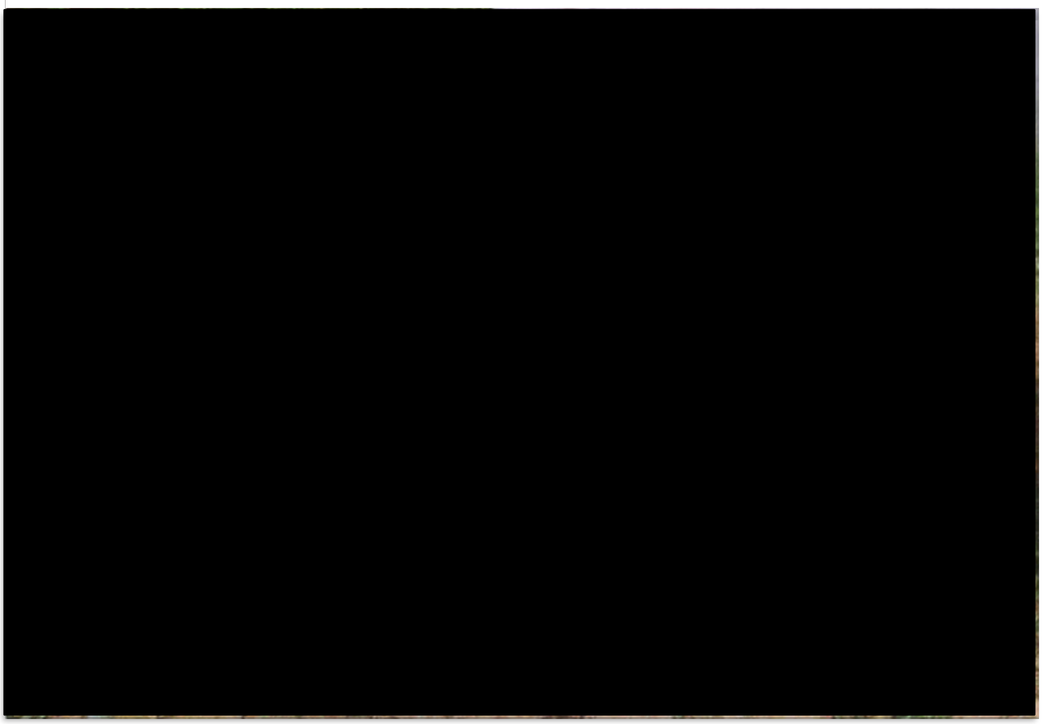

Figure 4.15. showing a reconstruction of a hearth structure from the site of Monruz, Switzerland. Image after Leesch *et al* (2010, 60).

Fire was also an important social technology. The social benefits of the hearth should not be underplayed. The coming together of the group, with the hearth as focal point, to sing and play music, dance, tell stories and socialise, and manufacture objects, all exploiting the longer day a hearth provides, was likely a significant mechanism for keeping groups bonded, as well as acting as a foci for other activities (Roebroeks and Villa 2011; Wiessner 2014).

4.6. Art: A Knot in the Magdalenian Meshwork

Throughout the chapter, it was noted that the categorical division of humans, animals and objects was overly formal and rigid, unlikely to reflect meaningful divisions within the Magdalenian world, a position with growing support (e.g. Fuentes 2016). This is especially clear in art (Fuentes 2016, 3), where the coming together of animals, humans and things is a constant. Magdalenian art was a meeting point for animals, humans, and things, and the relations between these entities were conceived within a worldview that likely did not impose divisions between categories.

There is a dramatic proliferation of art in the Magdalenian period, indicating it was a significant type of material culture (Sieveking 1979). The period is home to some of the most famous examples of parietal art, such as Altamira and Lascaux (Fig 4.16.). Portable art is prominent with ‘functional’ and ‘non-functional’ pieces being common across many sites. Stone plaquettes are something of a new element to the art repertoire and have only limited forebear in earlier periods (Sieveking 1991). They seem to be intermediary between the stationary parietal art and true portable art on bone and antler (Sieveking 1991). Other

Figure 4.16.

Figure 4.16. showing example parietal art from Lascaux, France, in this instance centring on a bison in left profile. Image courtesy of Wikimedia commons.

types of art, such as musical instruments, or portable pieces such as beads and pendants, are also common. The creation of finger flutings and hand stencils is similarly frequent during the Magdalenian (Morley 2009; Sharpe and Van Gelder 2006; Van Gelder and Sharps 2009).

Stone plaquettes with engraving across the surface seem to be a new addition to the corpus of art (Sieveking 1991). These objects will be considered in greater depth in the Montastruc chapter. Some collections of plaquettes were vast. For example, at the cave site of Enlène, France, dating to the Middle Magdalenian, 1,117 engraved plaquette and plaquette fragments were found, featuring naturalistic animal depictions, enhanced by the exploitation of the natural shape of the stone supports (Bégouën and Clottes 1991, 65, 72; Giraud *et al* 1982, 103). The plaquettes from Enlène have been argued to have been made with an unskilled hand, with the use of multiple, unconfident lines to create animal outlines, evidencing a range of skill and access in at least some types of Magdalenian art, perhaps even evidencing the action of apprentices (Bégouën and Clottes 1991, 73-75, 77). Plaquettes are sometimes found in association with hearths and structures. For example, at Gönnersdorf and Andernach, Germany, dating to 15,726-15,360 cal BP (95.4% confidence), engraved stones paved the floors of structures, most famously with schematic female figures (Bosinski 1991, 51, 56; Street and Turner 2015, 3).

The Upper Magdalenian saw the maintenance of long distance social networks, mediated through material culture. One clear example is the widespread presence of schematic female forms across western, central and eastern Europe, in association with a range of art types (Bosinski 1991; Langlais *et al* 2012, 143). These are commonly referred to as the 'Lalinde-Gönnersdorf type' (fig 4.17.), a highly schematic female form, depicted in silhouette and side profile and in a bent posture, hyper stylised and with no head or legs, and with exaggerated buttocks and breasts (Bosinski 1991; Gaudzinski-Windheuser 2015).

Animals are a common theme in Palaeolithic art and this is also true of the Magdalenian. The animals selected for discussion in the sections above give an interesting insight into human/animal relations in the Magdalenian when compared with the art record. Dogs were the first domesticates and were rarely depicted in art, horses were both economically and cosmologically significant and abundant in the art record, bison were economically less significant but a common theme in art, and reindeer were economically significant but are

Figure 4.17.

[redacted]

Figure 4.17. showing engravings of female forms from the site of Lalinde, after which this type of human engraving in named. Image courtesy of Musée Archéologie Nationale. Scale in cm.

rarely depicted in the art. However, as much as this betrays a difference in human/animal relationships by species, it also highlights the visual approach to art. While reindeer are rare as the thing depicted, they are central in the material used to make art. Reindeer antler and bone are common materials used for the creation of classically functional art objects that act as a support for decoration. In the process of interpretation the reindeer has been lost, thought to be of no value, a mere support for art rather than an integral part of the art itself. Given the importance of reindeer in the Magdalenian lifeway, the use of the bones or antlers might have been as significant as the engraving or decoration of the surface. This observation is only possible because the broader significance of reindeer within the Magdalenian has been articulated within a broader contextual framing.

This is not to say how the art looks is not important. Bison, of which there was at least two species (Soubrier *et al* 2016) and horses are the most common types of animal depiction in Magdalenian art. Variance has been found amongst each category, with different ages, seasons, sexes and behaviours depicted. These have all been categorised as bison and horse and so they are labeled as a highly prevalent species category. But what is 'horse' and what is 'bison'? To hunting and gathering communities, they might be terms that are so broad as to be relatively meaningless. For example, the Saami have some 600 words for reindeer, describing their particular characteristics, behaviour and status (Clottes 2013, 9). These are not just, for example, a male horse depicted in autumn with winter coat and raised tail in aggressive posture; instead, they are a male-horse-depicted-in-autumn-with-winter-coat-and-raised-tail-in-aggressive-posture. Depicted attributes were likely deeply significant, to the point where depictions of bison or horses might be quite distinct sub-categories, within the broad, overarching category of horse or bison (or indeed any number of animals). The appreciation of the complexity of animal/human relationships in the Magdalenian facilitates the exploration of the art record in a more nuanced way, with this new perspective encouraging an exploration of the record in novel ways. There is the potential to understand the art anew, with aspects of the art previously hidden through orthodoxy revealed through the adoption of an alternate approach.

The use of human body parts in art perhaps further evidences a softening of categorical divisions between humans, animals and things through the creation of art. In the case of the use of human body parts, human/thing becomes human-thing. Table 4.d. is a table of human body parts that have been used to manufacture objects, often art. Though few in number, such objects highlight the intricacies of Magdalenian cosmology. There is perhaps a parallel to be drawn between the use of animal teeth for use in art, usually for adornment as beads, and the use of human teeth for the same purpose. Many of the items noted in the table are worked elements of the skull. This further supports the view that there is special attention to the head in the Magdalenian. It also suggests a parallel treatment in at least some human and animal body parts; both being made into art, focusing on actions the human/animal performs, as was discussed with horses above (Birouste *et al* 2015). This lack of division in the art record suggests a more equal relationship between animals, humans and things, and a flow between categories. This realisation is a stepping-off point for a new, specific and contextual exploration of engraved plaquettes from Montastruc.

Table 4.d.

Site	Location	Date	Culture	Element	Object	Function	Quantity	Reference
Gough's cave	UK	12,600-12,500BP	M	Calvarium	Skull cup	unknown	1	Orschiedt 2013, 125
Le Placard	France		B/EM	Calvarium	Skull cups	unknown	5	Orschiedt 2013, 123
Le Placard	France		B/EM	teeth	Perforated pendants			Orschiedt 2013, 127
Bédeilhac	France		LM/FM	2 incisors, 3 canines, 1 premolar	Perforated pendants	Likely for suspension	6	Orschiedt 2013, 127
Chaffaud	France		M	teeth	Perforated pendants			Orschiedt 2013, 127
Saint-Germaine-la-Riviére	France	16,000BP	M	Upper second premolar	Perforated pendant			Orschiedt 2013, 127
Veyrier cave	France		M	Cranium	Perforated cranium discs	Pendants for suspension		Orschiedt 2013, 127
Enlène	France		M	mandible	perforated mandible fragment, with red ochre and signs of scraping	Pendants for suspension		Orschiedt 2013, 127
Grand Salle	France		M	Skull, mandible	scraping, shaping and engraving present	Unknown. Possible portable art	100 fragments, 4 with modification	Orschiedt 2013, 127
Brillenhöhle	Germany	12,470±65BP	M	calotte	Calotte container	Used as a container for 37 bone fragments		Orschiedt 2013, 124

Table 4.d. showing humans body parts manufactured into objects. Data derived from Orschiedt 2013. Image: author**.**

4.7. Summary: Strands of a Magdalenian Meshwork

The Magdalenian world was deeply interconnected; humans, animals and things were intertwined, with art as a prominent example of how these categories interact within the same object. Art can be understood as a knot within a broader Magdalenian meshwork. Plotting the strands that interconnect and flow into art was only possible through a broad understanding of the Magdalenian. This broad understanding of the Magdalenian in turn acts as a primer for the exploration of a specific site and for a specific collection, where again these relationships can be traced, but at a far more intimate scale. Here the review of the Magdalenian acts in a second important way in creating a course-grained contextual frame around the decontextualised site of Montastruc. The process of contextualisation is necessarily multi-tiered. This deeper understanding of the site itself in turn can contribute to a deeper understanding of the engraved plaquettes from the site. The course-contextual frame of the Magdalenian facilitates the creation of a finer contextual frame at the level of the site to facilitate the contextualisation of the plaquettes, the specific body of objects of interest. This does not replace the original context lost in early excavations but it does facilitate a deeper and more meaningful analysis of the plaquettes, with an awareness of how art is interconnected with other bodies of material culture, both in the Magdalenian more broadly and also at the site, to some extent. In subtly teasing out some animistic themes, there is further justification for a more specific application of the animistic ontological and relational framework outlined in chapter 3. In the Magdalenian world, such an approach carries both demonstrable relevance and explanatory power.

Chapter 5. Montastruc: Building a Site-Level Contextual Frame

Chapter 5. Montastruc: Building a Site-Level Contextual Frame

5.1. Introduction

This chapter explores the site of Montastruc, the history of excavation, stratigraphy and artefacts recovered to aid in the reconstruction of activities carried out there. This data is used as a contextual frame to build an understanding of activity at Montastruc. This is an essential element in facilitating the exploration of an object biography of the plaquettes from the site. Due to the poor recording of the excavations at Montastruc, the chapter focuses on the analysis of the material culture record to achieve this, focusing on objects recovered by Peccadeau de l'Isle stored in the British Museum. Holdings from France, largely from the Bétirac excavations, are discussed in summary, based on the analysis of published sources. A deeper consideration of the site will facilitate a more nuanced understanding of the plaquettes that were made and used at that site. The chapter brings together a summary of previously published research by Peccadeau de l'Ise and Bernard Bétirac, the excavators of Montastruc, to create foundation knowledge of the site. This is enhanced by expanding into a discussion of the results of analysis of all objects stored in the British Museum from the Peccadeau de l'Isle collection, the majority of which have previously gone unpublished. These results are presented by artefact type. When taken with the historical review, the chapter provides a detailed site review that can be used to reconstruct activity at Montastruc. It is this reconstruction that acts as a contextual frame for the specific analysis of the plaquettes from the site.

5.2. Introduction to The Site of Montastruc

5.2.1. Discovery and Excavations by Peccadeau de l'Isle: 1864, 1866-1867

The site of Abri Montastruc is located in Tarn-et-Garonne, Aveyron Valley, south-central France (fig 5.1.), positioned below a 29m high limestone escarpment adjacent to the small town of Bruniquel (fig 5.2.; Bétirac 1952, 213; Cook 2010, 10; Ladier and Welté 1993; Langlais *et al* 2007). Montastruc is part of network of sites termed the Abris du Château, consisting of Abris Plantade and Abri Lafaye, both excavated in 1864 by Brun, and Abri Gandil, excavated in 1928 by Chaillot, and 1980-1990 by Ladier (Bétirac 1952, 213; de l'Isle 1868, 214; Langlais *et al* 2007; Sieveking 1987a, 63). There are additional sites nearby, including Courbet Cave, excavated by Comte de Lastic-Saint-Jal and Richard Owen in 1863-1864 (Owen 1863-1864; 1869), and Enléne, excavated by the Bégouën family (Bégouën and Clottes 1991). Collectively, they reflect a local region rich in Magdalenian archaeology.

Figure 5.1.

[redacted]

Figure 5.1. showing the location of the network of sites to Montastruc belongs (red circle) and the surrounding locale, including the Tarn-et-Garonne that meanders through the landscape. Base image courtesy of Google maps. Image: author.

Figure 5.2.

[redacted]

Figure 5.2. showing the location of the site of Montastruc in association with other nearby sites and the river Aveyron. Image after Langlais *et al* 2007.

Montastruc was discovered during the expansion of the Paris-Toulouse rail line during the 1860s by Peccadeau de l'Isle, a Compagnie de Chemin de Fer de Paris à Orleans engineer, during earth clearance for the production of railway embankments (Cook 2010, 9). Initial archaeological discoveries and subsequent excavation began in 1864 and work continued across 1866 and 1867 (Cook 2010, 9). Around 7m of deposits was cleared in total, with little stratigraphic recording or spatial control, practices typical for the period and reflective of the intellectual context of the mid to late 19th century (Cook 2010, 10; Cook 2013, 270; Sieveking 1987a, 64; Schwendler 2012, 338). The 1860s were a time of great flux in Victorian society, with an emerging appreciation of deep time, based on the uniformitarian principles of Lyell and the evolutionary principles of Darwin, the acceptance of the existence of portable art in association with early humans, as well as broader technological and societal developments associated with the height of 'the age of progress', as reviewed more fully in chapter 2. These excavations were part of this broader 19th century acceptance of the antiquity of humans and the attempt to locate and recover ancient remains and connect them with early humans (Cook 2010, 13). This encouraged an excavation strategy of rapid clearance focussing on the recovery of artefacts, with a view to establishing a link between recovered extinct faunas and humanly modified objects, demonstrating the depth of human antiquity.

Consequently, the context of the material remains recovered from Montastruc is poorly understood. Little in the way of records survive from these excavations, other than a short summary paper published by de l'Isle in 1868, writing of discoveries made in 1866. There is a note within the paper that, subject to the completion of drawings by a monsieur F. Lenoir, a more substantial work would be published, including the engraved stone artefacts (de l'Isle 1868, 220), a work that seemingly was never completed. In his discussion of Montastruc, de l'Isle (1868, 214) notes the site faces northeast and sits below a limestone cliff 29m high, with an overhang 14-15m high, proximate to the river Aveyron. He suggested that bone bearing deposits were up to 6-7m deep across the excavated area and that 12 distinct levels were identifiable during his excavations (de l'Isle 1868, 214). These levels were composed of a succession of sands and silts with red pebbles, the latter of which were deposited due to periodic flooding of the river Aveyron (de l'Isle 1868, 214). de l'Isle further noted the presence of ash and charcoal interspersed between each layer of silt. This he took as evidence of his theory of an oscillating pattern of occupation and abandonment of the site based on the local conditions of the river at any given time (de l'Isle 1868, 214). The eventual abandonment of the site was evidenced by the presence of layers of decomposed limestone blocks (de l'Isle 1868, 214).

de l'Isle makes reference to the fauna he encountered during his excavations, though fails to note any horizontal or vertical patterning. However, he did note the presence of flint debris, as well as possible bone breaking for marrow extraction, suggesting the fauna was an anthropogenic assemblage (de l'Isle 1868, 215). Reindeer, deer, horse, 'beef' (likely bison/aurochs), 'goat' (likely chamois/ibex), saïga, bear, wolf, fox and beaver, are reported, and more broadly that the remains of mammals, birds and fish were recovered (de l'Isle 1868, 215). He suggested fish remains likely belonged to salmon and that their presence at the site reflected the repeated, seasonal exploitation of a salmon run along the river Aveyron (de l'Isle 1868, 215).

While Montastruc was cleared rapidly with little in the way of recording, there is evidence for care in artefact retention. Stone tools under 10mm in size and small, finely engraved pieces of bone were recovered. The material culture assemblage is diverse and includes stone tools, harpoons, decorated stone slabs, as well as hunting and fishing equipment, all of which were described by de l'Isle (1868, 215 onwards), and considered in greater depth below (Cook 2010, 10; Sieveking 1987, 63). de l'Isle specifically noted the presence of small flint pieces numbering in the thousands, barbed 'arrows' of reindeer antler, skillfully produced needles, pierced tooth ornaments, whistles made from reindeer phalanges, and other implements of unknown function (de l'Isle 1868, 215). In discussing the stone tools, de l'Isle (1868, 215) noted they were typically smaller than those excavated by Lartet and Christy in the Vézère valley. He notes the presence of blades, 'knives', scrapers, as well as points and burins. The latter were found in large number, which he attributed to their role in the production of bone, ivory, and stone art (de l'Isle 1868, 215). He notes the presence of denticulated bladelets and micro-piercers, which he attributed to the production of a large quantity of eyed needles at the site (de l'Isle 1868, 216).

de l'Isle recovered a large quantity of portable decorated objects, numbering 160 pieces in total. A range of materials was used, with 1 piece made in ivory; 67 pieces made in antler, much of which was naturally shed and subsequently collected (Cook 2010, 25); 41 pieces made in bone, likely derived from kills; and 52 pieces made in stone, likely derived from weathered fragments of rockshelter wall, naturally detached from the rock face via freeze-thaw action (Sieveking 1987a, 64). de l'Isle makes detailed reference to the work of Lartet and Christy in the Vézère valley, where art was first found. It was this work that likely primed him to identify and recover art at Montastruc. Many of the decorated organics de l'Isle describes as of an unknown function. Three additional objects are considered in greater depth: the swimming reindeer, then in two pieces, and a spear thrower decorated with a mammoth. These pieces he identifies incorrectly as dagger handles/poignards (de l'Isle 1868, 217). Given the early date of publication, it is significant that, while functional based on his interpretation, these pieces he takes as artistic masterpieces, noting their inclusion in the 1867 universal Paris exhibition (de l'Isle 1868, 218). Linking to the research context above, de l'Isle notes that the ivory used to produce the swimming reindeer was worked in a fresh state, evidencing the antiquity of those people who inhabited the site lived at the same time as mammoth (de l'Isle 1868 218-220).

Artefacts from Peccadeau de l'Isle's excavations were sold to the British Museum in 1887 for 150,000 Francs, or around £580,000 in contemporary currency, where they are still held and curated. The faunal assemblage was later separated and curated in the Natural History Museum (Cook 2010, 11). Elements of the Peccadeau de l'Isle collection was displayed in France before its curation in the British Museum from 1887 at the geological society of Toulouse in 1886, as well as two earlier exhibits in Paris from 1867 (de l'Isle 1868, 220). Sieveking (1987a) describes many of the objects, and especially organic pieces, as displaying recent breakage, and many of the plaquettes have ink within the engraving to make designs more readily visible. Both traces likely stem from these early displays in France and in the British Museum before the 20th century (Read 1902).

5.2.2. Excavations by Bernard Bétirac: 1946-1947, 1956-1957

Excavation of Montastruc recommenced between 1946-1947 and 1956-1957, directed by the amateur archaeologist Bernard Bétirac (Bétirac 1952; Ladier and Welté 1993). Publication of these excavations is limited to a single short report (Bétirac 1952), summarising the 1946-1947 seasons of excavation, detailing significant finds and attempting to resolve the stratigraphy of the site. The latter phase of excavations, 1956-1957, was never published. While Peccadeau de l'Isle sold his collection to the British Museum, artefacts recovered by Bétirac stayed in France, stored primarily in Le Musée d'Histoire Naturelle Victor Brun, Montaubon, and Musée Archéologie Nationale, Saint-Germaine-en-Laye.

Bétirac produced a sketch of the area removed by Peccadeau de l'Isle, as well as a section drawing of his own excavations (fig 5.3.). It is probable that Peccadeau de l'Isle truncated the top of the sequence, possibly as result of clearance for the production of the railway embankment, and then preferentially removed sediment from the back of the rockshelter. Bétirac's own excavations revealed seven layers, summarised in the table below (table

Figure 5.3.

[redacted]

Figure 5.3. showing the extent of excavations by Peccadeau de l'Isle (void and left) and Bétirac (right), noting the stratigraphy encountered by Bétirac. Image after Bétirace (1952, 217).

5.a.). The disparity between Peccadeau de l'Isle's 12 layers and Bétirac's seven may be the truncation of the sequence by the activity of the former, or simple inaccuracy due to its low priority in the earlier excavations. Bétirac's work remains the clearest record of the stratigraphy and the association of material culture for the site. When compared to the nearby Magdalenian II site of Abri Gandil (Langlais *et al* 2007; fig 5.4.), for example, both sequences seem simplified and it is likely that Bétirac's and de l'Isle's sections provide only a simplistic representation of the true complexity of the stratigraphy. While perhaps a limited record by contemporary standards, it does allow some inferences to be made about the provenance and age of material from the de l'Isle excavations that would be otherwise entirely unstratified.

Table 5.a.

Layer	Depth Range (metres)	Sediments	Artefacts	Fauna	Culture/ Age	Reference
I	3.40-4.20	Sandy and laid down by fluvial action	May have been washed out due to high energy conditions	may have been washed out due to high energy conditions	Magdalenian III?	Bétirac 1952, 16; Ladier and Welté 1993, 135
II	4.20-4.35	Reddish in colour	Rich in lithics and bones	reindeer and horse dominant,	Magdalenian IV	Bétirac 1952, 217 Ladier and Welté

				with 'large bovid', red deer, ibex. Fox, marmot, hare, willow ptarmigan, black grouse and red billed chough		1993, 135
III	4.35-5.00	Sandy with inclusion of limestone blocks	Some bones and numerous lithics, possible workshop in this layer with a number of flakes found around a large stone	No specifics noted	No cultural attributi on noted	Bétirac 1952, 217-218; Ladier and Welté 1993, 135
IV	5.00-5.55	Sandy texture, black in colour and free of scree. Evidence for fire cracked rock.	Rich in Late Magdalenian finds	primarily reindeer and various fish. Horse, chamois, boar and red deer are found in less. Targeting of young animals.	Magdal enian V and VI	Bétirac 1952, 218; Ladier and Welté 1993, 135
V	5.55-5.60	Entire layer composed of a thin layer of white ash	No specifics noted	No specifics noted	Mesolit hic?	Bétirac 1952, 218 Ladier and Welté 1993, 135
VI	5.60-not specified	No specific noted	Sterile	Sterile	Sterile	Ladier and Welté 1993, 135
VII	Not specified	No specifics noted	Sterile	Sterile	Sterile	Ladier and Welté 1993, 135

Table 5.a. showing a reconstruction of the stratigraphy at Montastruc, as reported by Bétirac. Data derived from Bétirac 1952 and Ladier and Welté 1993. Table: author.

Figure 5.4.

[redacted]

Figure 5.4 showing the stratigraphy from Abri Gandil, a site which sits nearby Montastruc. Image after Langlais *et al (*2007).

Bétirac's stratigraphic sequence suggests phases of periodic fluvial action in the rockshelter, rendering it unsuitable for occupation for some or all of the time during such flooding events, corroborating de l'Isle's observations. This affects Montastruc at the base of the sequence, likely precluding earlier Magdalenian activity, and perhaps also phases within layer IV, suggesting some disruption through to a phase of later Magdalenian VI occupation (Bétirac 1952, 218). Sieveking (1987a, 63) has also suggested that the nearby river Aveyron may have influenced the stratigraphy by virtue of its fluctuating water level through time. She speculates that when the river level was high the site likely became uninhabitable, with little to no anthropogenic action and only sterile river deposits represented in the sequence (Sieveking 1987a, 63). This same scenario has also been suggested for the nearby site of Courbet cave. Courbet would appear to constitute a primarily Magdalenian V occupation in contrast to Magdalenian IV and VI at Montastruc (Owen 1863-1864; Sieveking 1987a, 63). This may suggest that different sites were occupied within the landscape dependent on the position and level of the river.

5.2.3. Stratigraphy and Dating

Bétirac's layers II, III and IV are where most finds were recovered. Bétirac (1952, 218) suggested that layer III has evidence for a possible knapping area, organised around a large central stone. The cultural attribution of this layer has not been noted, only that anthropogenic activity is present. Layers II and IV are significant for their potential to help date the site. Layer II is described as reddish in colour, sandy in texture, and rich in artefacts. Bétirac (1952, 218) attributed the finds from this layer to Magdalenian IV, or Middle Magdalenian. Layer IV is described as a black layer, sandy in texture, with a similarly rich artefact assemblage, and a specialised faunal assemblage targeting a narrower range of species and younger individuals (Bétirac 1952, 218). Bétirac (1952, 218) attributed the artefacts from this layer to final Magdalenian V and Magdalenian VI, or the Late Magdalenian, though the Magdalenian V attribution has been contested (Ladier and Welté 1993, 135). Sieveking (1987a, 63) notes that the preponderance of naturalistic animal representations in art pieces from the site support a Magdalenian temporal and cultural attribution of Magdalenian IV and VI, or Middle and Late Magdalenian (Cook 2010, 42; Sieveking 1987a, 63-64). Limited radiocarbon dating of material derived from the Peccadeau de l'Isle collection in the British Museum broadly supports this attribution. Two samples yielded dates of 14,680-13,538 cal BP (94.7% confidence) and 15,989-15,205 cal BP (95.4% confidence) (Cook 2010, 42). However, these dates should be treated with great caution as they were produced in 1969 during the infancy of the radiocarbon method and have high error ranges (Cook 2010, 42).

5.3. Fauna

Bétirac's excavation has furthered the understanding of the faunal signature through time at Montastruc (table 5.a.), though this is still a fairly general analysis. The breadth of fauna appears greater in those layers attributed to Magdalenian IV, with peaks in the quantity of horse and reindeer (Bétirac 1952, 218). Medium size ungulates are common and there is evidence for the exploitation of small game in the form of mammals, fish, and birds (Bétirac 1952, 218). By contrast, the signature in Magdalenian VI layers is less diverse, consisting primarily of reindeer and with evidence for the targeting of young individuals (Bétirac 1952, 218). As noted in table 5.a., Bétirac encountered a diverse range of fauna. This reflects a possible change in hunting practice and site use from a generalist strategy during Magdalenian IV, with birds, fish, and small and large mammals present, and a more specialist strategy in Magdalenian VI, with young reindeer and fish being the dominant species. From the limited information provided by Bétirac, two points are significant in relation to the art objects from the site. The first is the mismatch between the fauna at the site and the animals depicted in the art, also noted for the Peccadeau de l'Isle excavations. As discussed in chapter 2, early analyses interpreted animal depictions in art to be a type of sympathetic magic. The mismatch between animals hunted and animals engraved would argue against that interpretation for art from Montastruc. The second is the utilisation of shed antler to produce art, which may be significant in trying to understand the art from the site. Sieveking (1987a, 17) suggests that the majority of antler from Montastruc was shed rather than taken from a dead animal, with the majority of the pieces subsequently worked and decorated, supporting Bétirac's position.

Re-analysis of faunal assemblages cannot only provide information about the site but also have potential for the uncovering of additional pieces of art missed during initial excavations. Recent findings of art depictions on pieces of animal bone and antler have been found in the holdings of the Natural History Museum, notably a schematic drawing of a horse head on a fourth metapodial from Courbet cave (Kaagan 2000; Kaagan *et al* 2011; Bello *et al* 2013a; fig 5.5.) and a schematic horse on reindeer antler from Neschers, France (Bello *et al* 2013b). There is potential that with future research on the collections from Montastruc and other sites with faunal collections in the Natural History Museum that more such discoveries of art will be made that have been overlooked, especially with the

Figure 5.5.

[redacted]

Figure 5.5. showing art that has been discovered within archived collections. A is a horse on reindeer antler from Neschers. B is a piece of bone with a horse engraving from Courbet, France. Image after Bello *et al* (2013, 2465).

increasing use of digital techniques (Bello *et al* 2013a). There is similar potential for the faunal collections held in institutions in France.

5.4. The Results of Artefact Analysis

While summary publications by de l'Isle and Bétirac provide a critical insight into Montastruc, its stratigraphy and dating, fauna and some of the activity that took place at the site, many questions remain. An analysis of the artefacts recovered form the site is now the best avenue to providing further insight into the site of Montastruc. Presented below are the results of initial analyses of all objects recovered by Peccadeau de l'Isle stored in the British Museum. The collection is composed of some 15,620 artefacts in total. Many objects are considered for the first time. When taken together, they provide essential further detail and nuance, reflecting a significant development in the understanding of the site. Each category of object encountered is discussed in turn, along with its significance.

5.5. Stone Tools

Working with long curated lithics from an excavation stemming from the origins of Palaeolithic research limits the range of analysis that can be undertaken. Three factors limit the research agenda for this material: their lack of 3D spatial data, their long curation with uncontrolled handling, and the selective collection and retention of objects by the initial excavators. Perhaps the most significant is the lack of any 3D spatial information. This makes detailed lithic analysis, especially of spatial and temporal differences, more challenging, if not impossible. Over a century of curation and handling has likely resulted in significant modern prehension traces, limiting the potential for the application of residue and microwear analysis, though there are macroscopic residues preserved on some tools (fig 5.6.). Selective collection, reflected in the limited quantity of recovered debitage, constrains attempts to refit lithics, which might have helped to reconstruct knapping activity. While limiting, a simple analysis of the lithics by quantity, working only at the general level, can still provide some information on activity at the site, such as the nature of occupation, procurement strategies, and mobility.

5.5.1. Scale of Activity

The lithics from Montastruc curated at The British Museum represent the full span of material retained by Peccadeau de l'Isle during his excavations of the site. In total, the stone tool assemblage numbers 14,520 pieces and figure 5.7. and table 5.b. details their typological category and quantity. This number is a slight under-estimate due to some pieces being on loan at the time of study. The lithics are stored in the British Museum by typological category, the analysis completed by Dr. Jill Cook. Given the lack of contextual information, it is difficult to definitely establish if there were changes in the nature of stone tool working through time at Montastruc. However, the quantity of stone tools recovered from the excavated area, and the likely significant debitage collection this implies that has not been retained, suggests activity was sustained, substantial and repeated. The lithics may

Figure 5.6.

Figure 5.6. showing a stone tool from Montastruc with possible ochre residue adhering to the surface, as well as possible burned residue. Image: author.

Figure 5.7.

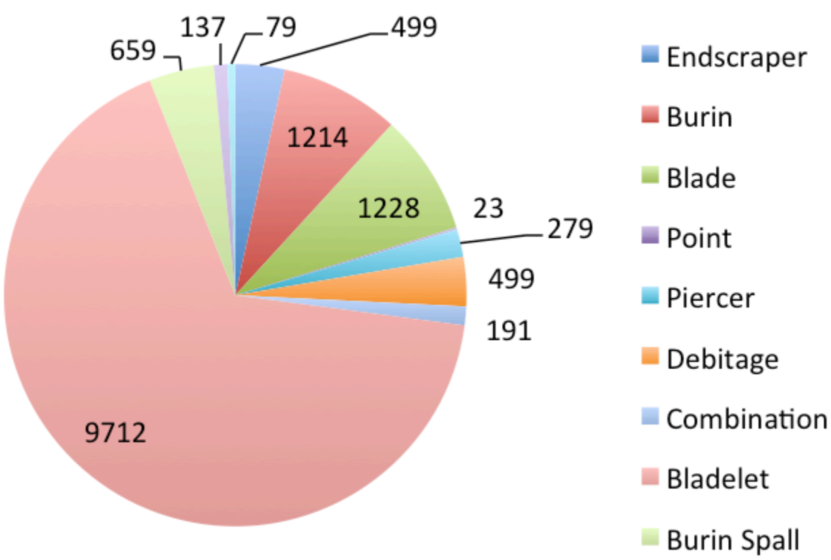

Figure 5.7. showing stone tools from Montastruc by tool type. Image: author.

point to a larger volume of people occupying the site for longer stays, perhaps with activity in this landscape occurring seasonally. However, this can only be a speculative interpretation given the limits of the data, only compounded by a lack of faunal assemblage.

Bétirac (1952) reports on some of the stone tools recovered from the site. However, no comprehensive published records exist and Bétirac (1952) only offers a limited commentary. Bétirac reports the finding of various types of burin, endscrapers, combination tools, piercers and cores, with a total count of 3,467 utilised pieces in total (Bétirac 1952, 220). This adds to the scale of activity at the site but doesn't fundamentally change its nature.

Table 5.b.

Artefact type	Total	Total as percentage
Endscraper	405	2.79
Double endscraper	20	0.14
Micro endscraper	41	0.28
Endscraper burin	106	0.73
Endscraper on flake	33	0.23
Endscraper perçoir	1	0.01
Dihedral burin	655	4.51
Burin	55	0.38
Dihedral/angle burins	74	0.51
Dihedral burins offset and angle	91	0.63
Dihedral burins on broken blade	70	0.48
Multiple dihedral burin	84	0.58
Burin on break	14	0.10
Burin de lacan, burin de peroquet	13	0.09
Burin on truncation	56	0.39
Burin on retouched truncation	110	0.76
Transverse burin	32	0.22
Magdalenian shouldered point	3	0.02
Truncated blade	4	0.03
Retouched blade	104	0.72

Notch and raclette	13	0.09
Backed bladelet	1348	9.28
Retouched bladelet	21	0.14
Denticulated bladelet	38	0.26
Azilian point	20	0.14
Miscellaneous retouch	33	0.23
Retouched flake	8	0.06
Píece esquillée	7	0.05
Chopper	1	0.01
Blade	882	6.07
Bladelet	5305	36.54
Unmodified bladelet	3000	20.66
Burin spall	659	4.54
Crested blade	238	1.64
Perçoir	279	1.92
Core	137	0.94
Handaxe	1	0.01
Debitage	369	2.54
Debitage flake	52	0.36
Quartz debitage	26	0.18
Utilised stone	16	0.11
Dihedral angled burin	44	0.30
Carnelian jasper debitage and calcite	52	0.36
TOTAL	**14,520**	**100**

Table 5.b. showing the full range of tool types recovered from Montastruc by Peccadeau de l'Isle, the numerical quantity of each category, as well as the percentage of each type in relation to the total. Image; author.

5.5.2. Stone Tools as Indicators of Age

Some specific tool types potentially provide some indicator of age. The assemblage can be considered as typically Magdalenian, with long blades used as a base for the creation of other tool types, the use of compound and composite tools (Enloe 2001, 181; Sterling 2014), and featuring heavy utilisation of bladelets (Enloe 2001, 179). The presence of raclettes is diagnostic of the Badegoulian (Enloe 2001, 185), an early phase preceding the

Magdalenian, and may indicate a small trace of some earlier activity at the site. Similarly, Azilian points would indicate a possible Azilian signature at the site, suggesting later Palaeolithic activity. These tools types and the periods they imply bracket activity at the site. It seems probable, given the nature of hunter-gatherer landscape use, that the site was seasonally occupied across different periods.

5.5.3. Types of Stone Utilised

Based on the size range of tools recovered, some below 10mm in size, the tools retained during the excavations are likely a representative sample. This size range is significant as excavations did not routinely implement sieving strategies in the 19th century and it indicates a somewhat careful excavation, at least in terms of the retention of finished tools. The clear difference between the number of tools recovered and the relatively limited quantity of debitage suggests the former was preferentially collected and retained over the latter. This may correspond to 19th century research strategy, concerned more with establishing the antiquity of humanity through unambiguous tools rather than the reconstruction of complete signatures of activity that the collection of waste such as debitage can provide. Appendix 6, a photo series of a sample of the stone tools, reflects the utilisation of a range of different types of stone in the production of tools at Montastruc. This includes primarily flints and cherts but also jasper. Sterling (2014, 10) suggests the possible exploitation of Bergerac flint in the region and some of the lithics possibly conform to its very particular colouration. If correct, this suggests the presence of some long distance transport of raw materials to the site, possibly from the Dordogne. There may be further support for a connection to the Bergerac flint from the nearby Early Magdalenian site of Abri Gandil where it was found in small quantity from layers 23-25 (Langlais *et al* 2007). The stone selected is in good condition, with little shattering, rolling, or other natural modifications, suggesting the probable exploitation of primary outcrops. A range of colour and texture indicates the exploitation of a diverse range of lithic sources, possibly both local and non-local sources given the range of materials present.

5.5.4. Debitage and Cores

A brief consideration of some of the specific stone tool types can provide further insights into the nature of activity at Montastruc. 499 (3.47%) pieces of debitage were recovered, representing all stone types, along with 659 (4.54%) burin spalls, indicating the re-sharpening of tools during use. There is some suggestion of earlier phases of the reduction sequence with occasional debitage pieces exceeding c.100mm in size, with cortex present, and some debitage linked with the working of cores, with numerous removal scars noted.

137 (0.94%) cores were recovered, many of which are small in size, likely linked to blade and especially bladelet production. The cores are typically under 100mm in largest dimension, and often much smaller. The cores are made on a range of materials, mostly flint (yellow, white, black, beige) and patinated pieces. Figure 5.8. offers some example cores, emphasising the range present at the site. The majority of cores are unipolar bladelet cores, which have been extensively worked and present as conical in shape (Taller *et al* 2014, 389-390). These specific cores may have been worked from pebble nodules. Along with the character of the debitage, this supports *in situ* knapping activity at the site, supporting Bétirac's (1952) observations of possible knapping areas. Given the presence of

Figure 5.8.

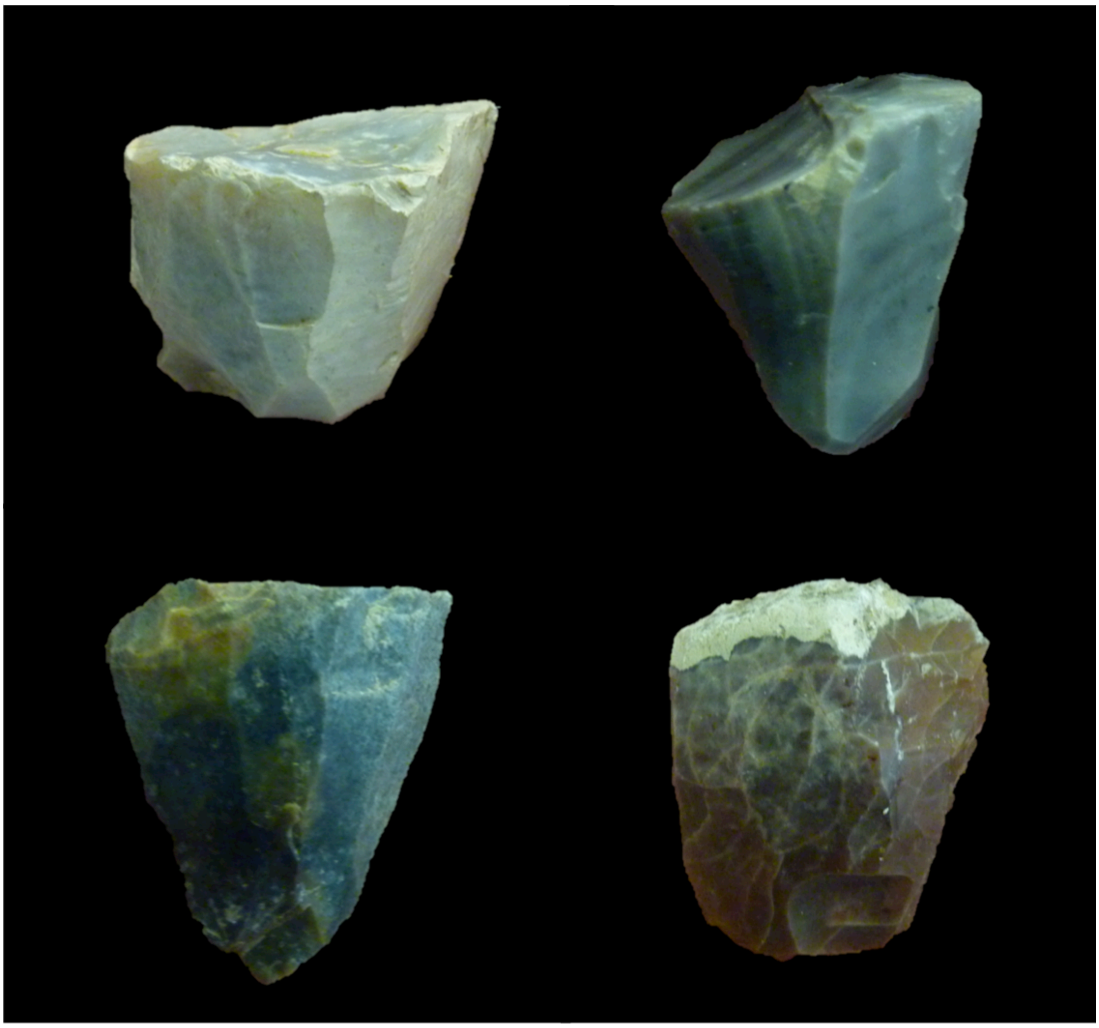

Figure 5.8. showing example cores from Montastruc. Image: author.

complete reduction sequences at the site, there may be scope for corresponding lithic refitting studies to better understand tool manufacture and reduction strategies, though the imbalance in the quantity of debitage to finished tools implies much of the debitage may have been discarded during excavation.

When taken together with lithics that retain traces of cortex, as well as the presence of 137 cores in the collection, these attributes can be used to suggest the presence of earlier knapping phases at the site with reduction to produce a range of tools, primarily blades and bladelets, the former then modified into other tools and the latter likely used in multi-component tools (Taylor 2012).

5.5.5. Bladelets

As figure 5.7. and table 5.b. show, 9,712 of 14,520 (66.89%) lithics can be characterised as some type of bladelet. A substantial number (1,348, 9.28%) are backed pieces, and a yet greater number are unmodified (3,000, 20.66%). Figure 5.9. presents some example bladelets from the site, emphasising the range of types and materials represented. The

Figure 5.9.

Figure 5.9. showing example bladelets from Montastruc. Image: author.

high density of unmodified pieces, and indeed bladelets more broadly, suggests knapping was taking place *in situ* rather than these pieces being transported from elsewhere in complete form. This is supported by the presence of bladelet cores in the collection. Taylor (2012; fig 5.10.) has discussed the likelihood of the use of bladelets in multi-component tools, likely as inserts for darts or arrows in hunting equipment. The organic assemblage, discussed in detail in the sections that follow, reveals the presence of weighted and unweighted spear throwers from Montastruc, as well as fragments of bevel ended points and baguette demi ronde, all implicated in the creation of hunting equipment. It is feasible that bladelets were in part used as inserts to form multi-component projectiles. These strands of evidence suggest that there was an emphasis on making hunting equipment at the site, supporting the conclusion reached by Cook (2010), and likely a corresponding focus on hunting activity, supported by the diverse faunal assemblage, already discussed (Bétirac 1952). There is growing evidence that bladelets might well have been used in diverse tasks beyond multi-component projectile points and that their prominence on Magdalenian sites reflects their effectiveness in diverse tasks (Taller *et al* 2014, 387). The quantity of bladelets at Montastruc might support this interpretation, with a quantity of blanks present and a diverse range of forms implying bladelets might have been used in numerous other tasks beyond hunting. In discussing the nearby site of Abri Gandil, Langlais *et al* (2007) report that bladelet production likely reflects domestic knapping, supporting observations drawn from the debitage and cores from the site.

5.5.6. Burins and Endscrapers

While smaller in quantity, within the context of the assemblage both burins and endscrapers stand out as significant. There are 1,214 burins (8.36% percent) and 499 endscrapers (3.44%) when all types are combined. Figures 5.11. and 5.12. highlight some example burins and endscrapers, emphasising the range from the site. Both tool types can have multiple functions, for example hide working is strongly associated with the former (Keeley 2010). It is possible these tools were also utilised in the making of art (de l'Isle 1868; Fritz 1999; Semenov 1970, 158-160). Organic pieces show evidence of scraping and smoothing, and this would be consistent with the use of a tool such as an endscraper for course grained preparatory work. Burins would have been suitable for engraving due to their robust tip, perhaps especially useful in the engraving of abrasive limestone (de l'Isle 1868). While this observation is a potentially testable hypothesis, such efforts are likely to be frustrated by prehension polish, limiting the capacity to meaningfully apply residue or usewear analysis to confirm and association with the working of bone and stone.

Figure 5.10.

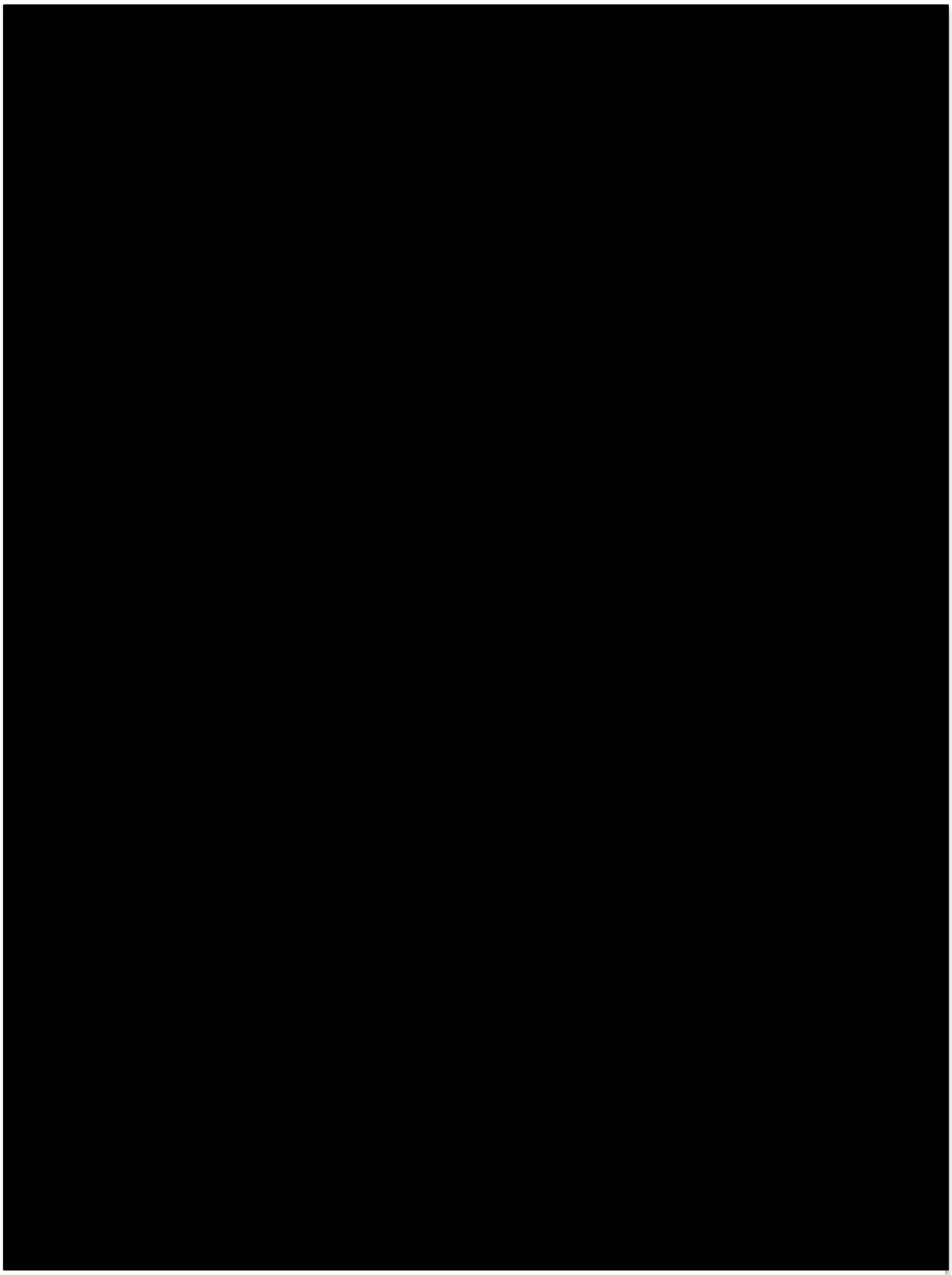

Figure 5.10. showing a schematic drawing of a composite projectile, based on data derived from the site of la Madeleine, composed of an organic shaft, typically antler, with backed bladelet inserts. Image after Taylor 2012, 20

Figure 5.11.

Figure 5.11. showing example dihedral burins from Montastruc. Image: author.

5.6. Organics

The organic assemblage is variable in its composition, representing decorated pieces with a clear function and decorated pieces with no discernible function. It is probable that as with the lithics this variability points to conflation of different spatial and temporal contexts. Appendix 8 provides a summary of Sieveking's (1987a) findings from her analysis of the de l'Isle excavations. Appendix 9, 10 and 11 provides a summary of a further 938 previously unpublished organic pieces from Montastruc. A descriptive catalogue and summary table of some of these objects is available in appendix 9 and 10, with a supporting image catalogue in appendix 11. The limitations articulated in relation to stone tools are equally applicable to organics, with a lack of spatial control limiting discussion of temporal relationships and clustering or patterning of finds. However, the categories of artefacts present, their type and quantity, can still provide insight into patterns of activity at Montastruc. Some of the major categories of organics are considered, exploring what they reveal about the nature of activity at Montastruc.

Figure 5.12.

Figure 5.12. showing example endscrapers from Montastruc. Image: author.

5.6.1. Antler and Bone Debitage

149 bone and antler pieces (14.26%) are debitage from the production of other pieces, some examples of which are presented in figure 5.13. Included in this category are pieces of bone and antler that have negatives where a splinter has been removed to produce a point, antler tines with long linear cut marks to remove it from the beam, and pieces with cut and chop marks. Taken together, and with needle and point cores discussed separately below, this debris suggests that at least some of the organic artefacts were being produced directly at the site, confirming de l'Isle's (1868) interpretation. As was evident from the

lithic analysis above, the entire organic reduction sequence for a range of objects is evident

Figure 5.13.

Figure 5.13. showing antler debitage from Montastruc. These pieces evidence the removal of tines from antler beams via cutting with stone tools. This would suggest that Montastruc was a site where antler objects were made. Image: author.

at Montastruc. This is significant in reconstructing activity at the site, implying that occupation may have been longer term and larger scale, likely by a number of families rather than a small, task specific group.

5.6.2. Spear Throwers

There are a total of 3 (0.29%) unweighted and weighted spear throwers from Montastruc. Figure 5.14. highlights some example spear throwers from the site. The spear thrower component effectively acts as an extra pivot to the human arm, increasing the power, range and accuracy of the propelled dart relative to an unaided throw (Garrod 1955;

Figure 5.14.

Figure 5.14. showing examples of fragmented spear throwers with naturalistic horse depictions in right profile (top) and left right profile (bottom) from Montastruc. Image: author.

Hutchings and Brüchert 1997; Raymond 1986). The major differences between weighted and unweighted spear throwers in functional terms would seem to be some minimal improvement in the distance and force a dart can be propelled, but primarily the addition of accuracy due to increased stability linked to the greater weight of the weighted spear thrower (Garrod 1955; Hutchings and Brüchert 1997; Raymond 1986). One decorated example from Montastruc has been recognised to conform to a highly specific decorative form of a deer faun defecating with a small bird perched atop its raised tail (Bahn and Vertut 1988; fig 4.19.). As noted in chapter 4, this includes Montastruc in a range of French sites that feature this very particular design, suggesting some degree of interconnection between sites. Long distance mobility, exchange, and aggregation were all significant elements of the Magdalenian lifeway and it is probable that this example highlights this interconnectivity between people across the region, mediated in part through their material culture. The spear thrower was a specialised component of a hunting technology used to propel multi component darts. Their presence is consistent with the use of bladelets in the creation of multi-component darts, as described above. Their presence at the site suggests hunting activity, correlating well with the high quantity and range of fauna from the site.

Some spear throwers are highly elaborately decorated, such as the spear thrower with horse depiction discovered by Bétirac (1952) and the spear thrower with mammoth depiction discovered by de l'Isle (1868). The horse spear thrower (Bétirac 1952, 227-230; fig 5.15.), for example, features a dynamic 'jumping' horse depiction, created partly in the round and partly engraved in 2D on the surface of a piece of reindeer antler, using the natural shape of the piece to guide the design and stance of the animal. Taken along with the mammoth spear thrower and the swimming reindeer found by Peccadeau de l'Isle, the execution of these pieces suggests individuals of great artistic skill were present at the site of Montastruc.

5.6.3. Bevelled Points

55 (5.26%) of the organic artefacts from Montastruc are fragments of double bevelled points. Figure 5.16. highlights some examples. These objects typically have decoration along the shaft and have a wedge shaped base, formed by cutting two bevels. These bevels frequently feature

Figure 5.15.

Figure 5.15. showing a spear thrower from Montastruc recovered during the Bétirac excavations. The spear thrower incorporates a horse into the handle, bringing together surface engraves of the antler shaft with the back legs and then 3D sculpture in the body, neck and head, facilitated by tucking in the front legs, making the animals appear to leap. Image courtesty of Musée Archéologie Nationale.

a series of deep, parallel, lateral lines engraved across them. These are likely functional,

Figure 5.16.

Figure 5.16. showing example double bevel points from Montastruc. Scale in centimetres. Image: author.

used to facilitate a friction grip between the different components of a multi-component composite dart. They would be concealed when the object was complete and are unlikely to be decorative. As noted above, the dart tip likely consisted of multiple backed bladelets inserted with resin into grooves running longitudinally along each side of the shaft (Taylor 2012). It is notable that the collection is fragmentary, with old breaks evident in some cases. This may suggest these objects have been broken in use, perhaps supporting that this site was in part used for hunting activity. The wooden shaft was likely recovered and re-used while the broken bevel ended point was discarded and replaced. Along with spear throwers and bladelets, these objects are part of a hunting technology, suggesting this was a significant activity at Montastruc.

5.6.4. Baguette Demi Ronde

Nine (0.86%) decorated organic objects from Montastruc are baguette demi ronde (half round rods). Some examples are given in figure 5.17. These are typically made from a length of antler beam that has been shaped, smoothed and cut to give two pieces with a semi-circular cross section. The spongyoma is often smoothed and reduced in the examples

Figure 5.17.

Figure 5.17. showing an example baguette demi ronde from Montastruc. Scale in centimetres. Image: author.

from Montastruc to leave a raised edge of hard cancellous bone to either edge. An oblique break is evident to some of the baguette demi ronde to distal end. However, this break looks to be controlled and intentional and yields a blunt and almost beveled end that could potentially serve as a tool. The baguette demi ronde typically features geometric motifs and signs across their outer surface. Other interpretations have been offered for baguette demi ronde, most commonly that they are a variant of the tip of a multi component dart head (Langley *et al* 2014). Instead of grooving the edge, as in the bevel ended points described above, the piece is split completely, lithics inserted, and then the two halves bonded back together with a mastic (Langley *et al* 2014). The removal of spongy bone in the Montastruc example may support this interpretation, creating a void where mastic could be inserted to hold lithic inserts. This could suggest that baguette demi-ronde are a part of the diverse hunting technology evident at Montastruc.

5.6.5. Barbed Points and Harpoons

There is a large quantity of barbed points from Montastruc, 50 in total (4.78%). Appendix 9 offers a summary of these objects and figures 5.18. and 5.19. highlights some of the range in the barbed point and harpoon assemblage. Nine (0.86%) can be described as uniserial barbed points and harpoons, 26 (2.49%) can be described as biserial barbed points and harpoons. The morphology of the points has often been used to date deposits by comparison with dated sites that display the same point type (e.g. Julien 1982). Some of the points are highly similar to those from the nearby site of La Vache, France (Pétillon 2015; fig 5.20.). This may suggest a Middle Magdalenian date for at least some of the activity at Montastruc, which would support the interpretation of dating at the site discussed by Bétirac (1952). Bétirac (1952, 221, 225, fig 5.21.) also notes numerous harpoons from the site. These are noted from layers II and IV, are both uniserial and biserial, and are considered to range from early and 'primitive' in the lower layers to more elaborate and fully realised in the higher layers. A further example is reported by Langley (2014), derived from the Bétirac excavations. Following Langley (2014), many of the diagrams show broken barbed points and/or points with short distal ends, both of which are suggestive of use. Occasional examples do show a longer distal end and this range may suggest barbed points were being made and used at the site.

The difference in size and shape of barbed points and harpoons can be used as a rough proxy for the type of hunting activity to which they might be employed. Specific forms were likely used to exploit particular species, whether based on size, its terrestrial or marine habitat and behaviour, or to prevent damage to the skin that might be a valuable raw material in its own right. Further work is needed to make clear the specific relationship between point projectile morphology and type of hunting, but the variation in size and shape of points suggests that hunting strategies were flexible and specific to the game being targeted. This is supported by observations drawn from varied species in chapter 4, in which it was suggested that to ensure hunting success, quite specific hunting strategies

Figure 5.18.

Figure 5.18. showing example fragments of uniserial and biserial barbed points from Montastruc. Scale in centimetres. Image: author.

might be employed, linked to the specific capacities and behavioural attributes of the

Figure 5.19.

Figure 5.19. showing fragments of harpoons from Montastruc. Scale in centimetres. Image: author.

species being targeted. The limited published fauna does reveal a varying and diverse range of species was exploited at the site (Bétirac 1952; de l'Isle 1868) and may support this interpretation of barbed points and harpoon morphology.

Figure 5.21.

[redacted]

Figure 5.21. showing example organic objects recovered from Montastruc by Bétirac. Image after Bétirac 1952, 225.

Figure 5.20.

[redacted]

Figure 5.20. showing an example biserial harpoon from la Vache. Scale in centimetres. Image after Petillon 2015, 16.

5.6.6. Fishhooks

There is a single fishhook (0.096%) from Montastruc (fig 5.22.). A significant number of fishhooks was recovered from nearby Courbet cave, suggesting the exploitation of fish from the Aveyron may have been part of the reason for locating sites in the valley. The presence of fishhooks further lends support to the presence and likely pervasive use of fibre technologies in the Magdalenian, with the use of tough string or twine being implied to be able to cast the fishhook or suspend them from lines. The presence of fishing gear, along with the remains of salmon at the site, implies a degree of local fishing activity at the

Figure 5.22.

Figure 5.22. showing a fishhook from the site of Montastruc. Scale in centimetres. Image: author.

site, possibly exploiting a seasonal salmon run. This correlates well with the faunal assemblage, where the likely presence of salmon was taken as evidence for the seasonal exploitation of fish at the river Aveyron, directly adjacent to the site (de l'Isle 1868).

5.6.7. Fishing Gorges

14 (1.43%) pieces might be described as fishing gorges. Superficially they resemble larger and thicker needles but lack the 'eye' or perforation for threading and taper to point at both ends. Figure 5.23. highlights an example. They were likely produced via the removal of

Figure 5.23.

Figure 5.23. showing an example gorge from Montastruc. Scale in centimetres. Image: author.

a splinter of bone or antler, using groove and splinter technique, and then smoothed and shaped using a fine-grained sandstone or similar stone to shape and finish the piece. Sandstones have been found at the site of Montastruc and are detailed alongside needles below. These objects have been described as fishing gorges, perhaps used for holding bait and lodging in the mouth of the fish during line fishing, acting in a similar capacity to a hook (Sieveking 1987a). There is a significant size range, with the largest being 2-3 times the size of the smallest, though all fall below 100mm in maximum dimension. Given the presence of other fishing gear, it is feasible that these objects were linked to an elaborate fishing technology. However, the form could equally be used as part of a small projectile point for use as part of a multi-component projectile.

5.6.8. Needles and Needle Cores

There are 97 (9.28%) needles from Montastruc. Figure 5.24. highlights an example. These needles are variable in size, possibly suggesting they were employed in a wide range of uses. de l'Isle (1868) suggested needles were being produced to replace needles that were broken at the site. Bétirc (1952, 221, 225, fig 5.25.) noted the presence of bone needles from layers II and IV of his Montastruc stratigraphy. Needles can be used as a strong inference for fibre technology, now lost entirely due to preservation conditions. Given the presence of fishing gear, the creation of nets using large needles is a speculative possibility in accounting for the presence of larger needles. Needles almost certainly can be used to support the presence of the making and using of sewn clothing at the site and this is a minimum prerequisite for survival in a cold climate. The same technology may have been deployed to sew skins into shelters or tent structures.

Figure 5.24.

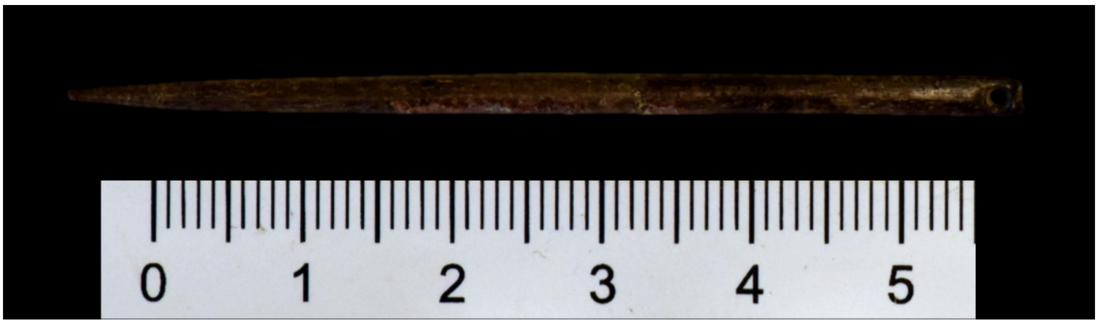

Figure 5.24. showing an example needle from Montastruc. Scale in centimetres. Image: author.

Figure 5.25.

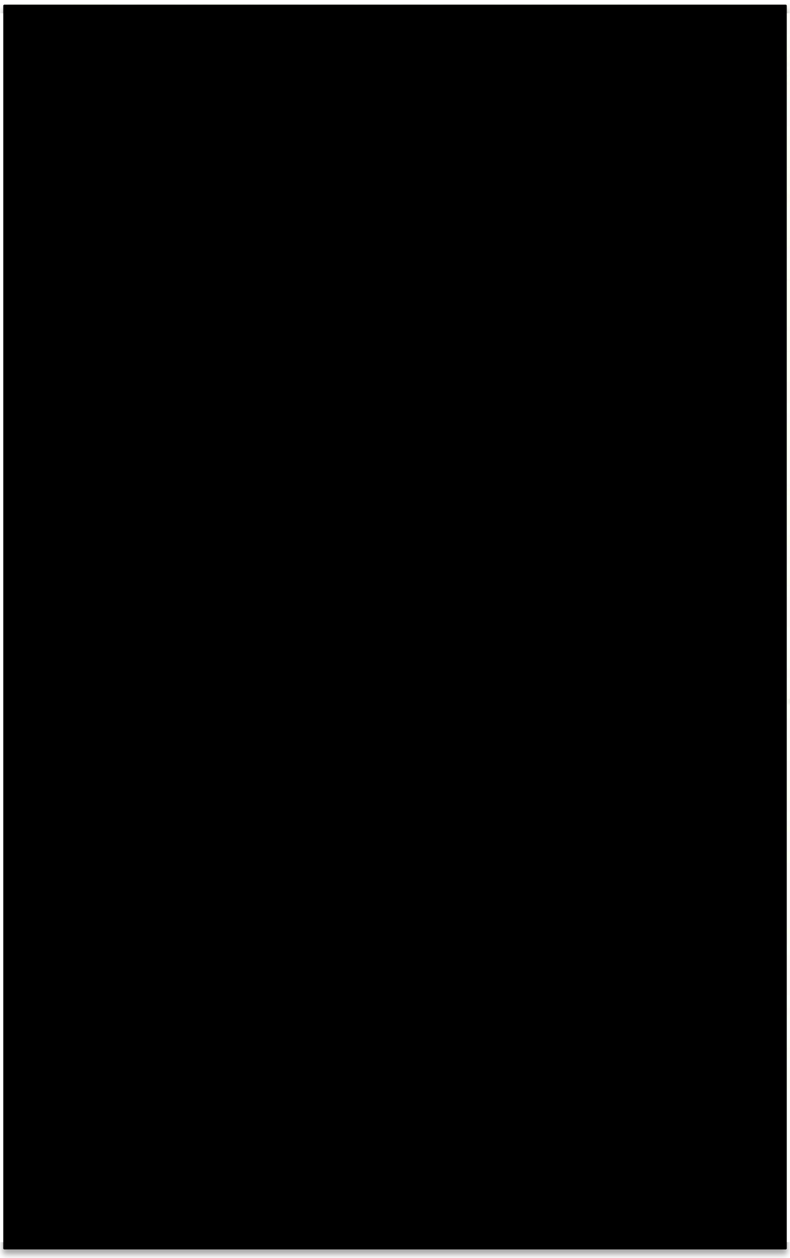

Figure 5.25. showing example organic objects recovered from Montastruc by Bétirac. Image after Bétirac (1952, 221).

There are 4 (0.38%) needle cores from Montastruc made from long bone, implying this may be the dominant material used in the creation of needles. Figure 5.26. highlights some example needle cores from Montastruc. Pieces show evidence of multiple groove and splinter removals around the bone to produce needle blanks. The needle blank was then perforated before being further reduced through grinding against a piece of fine sandstone. Pieces of fine, non-native sandstone (figure 5.27.) were transported to the site and show clear signs of having been used to grind needles and small points. Taken

Figure 5.26.

Figure 5.26. showing a needle core from Montastruc. Scale in centimetres. Image: author.

together, this suggests the full production and use of needles and points at the site. Needles are themselves significant in that they can be used to potentially infer a more substantial site in which a broader range of activities were enacted by a broader range of people. By contrast, a specialised site may show traces of exhausted needles but would be less likely to see traces of production.

5.6.9. Rondelles

There are 5 (0.48%) rondelles from Montastruc, the majority in fragmentary condition. Figure 5.28. highlights some examples. Rondelles are thin, circular disc cut-outs typically made from the blade of the scapula of medium sized ungulates. A clear example comes

Figure 5.27.

Figure 5.27. showing a non-native sandstone with distinctive grooving, reflecting its use in shaping organic objects, such as needle and gouges. Scale in centimetres. Image: author.

from the site of grotte de Saint-Michel d'Arudy, where three discs have been removed

Figure 5.28.

Figure 5.28. showing an example rondelle ('front' and 'back') from Montastruc. Scale in centimetres. Image: author.

from a scapula in this way (fig 5.29.). It has been hypothesized that production was aided by cutting around a circular stone (Conneller 2011), though it is feasible they were produced free hand. Rondelles also have a hole to the centre of the cut-out, or sometimes several holes positioned close to the outer edges of the pieces, which was likely used for suspension (Azéma an Rivère 2012). This may lend some indirect support to fibre technologies in the Magdalenian, with fine cordage or string likely having been used to suspend the rondelle.

Many rondelles are engraved, which can be variable. Sieveking (1971) notes a ‘type A’ motif, with lines emanating form a central perforation, ‘type B’ with lines emanating from a circled edge, denticulated edges, and ‘barbed line’ designs, all of which are present at Montastruc. Significantly, these designs can also be found at other sites, including Mas d’Azil (Sieveking 1971), further supporting the argument for connection between Montastruc and other surrounding sites. There is no clear consensus surrounding the use of rondelles, with some favouring their use as pendants (Conneller 2011; Sieveking 1971), buttons based on a human depiction found by Bétirac (1952; San Juan-Foucher and Vercoutére 2013, 126; fig 5.30.), as thaumatropes (Azéma and Rivère 2011; fig 5.31.), or perhaps even part of string making technology (Stone 2009, 2011).

Figure 5.29.

[redacted]

Figure 5.29. showing a scapula with bone cuts for use in making rondelles. The piece was discovered at the site of Grotte de Saint-Michel d’Arudy, France. Image courtesy of Musée Archéologie Nationale.

Figure 5.30.

[redacted]

Figure 5.30. showing example organic and stone art recovered from Montastruc by Bétirac. Image after Bétirac 1952, 226.

5.6.10. Perforated Batons

There are 8 (0.77%) perforated batons from Montastruc. Figure 5.32. details some examples of the range from Montastruc. They are made from the base of the beam of an antler, typically of reindeer, with the burr and tine removed. A minimum of one relatively large hole is perforated towards the base of the antler beam, though there are sometimes additional holes of varying sizes. The beam of antler acts as a support to a wide range of decoration, with detailed animal depictions numbering amongst them. The function of these objects has been something of an enigma. Stone (2009; 2011) and Kilgore and Gonthier (2014) have noted that the perforations sometimes show evidence of wear through contact with organic materials. The perforations may have been used to straighten wooden dart shafts (Cook 2010), perhaps supported by Stone's (2009; 2011) observations. If so, this lends further evidence to a pattern of making and using a broad range of hunting and fishing equipment at the site, along with the making of tools from wood and fibres that have failed to preserve. Taylor (1997, 128-129) has suggested that some batons, including an example from Montastruc, may be phallic representations. This is a view supported and expanded by Angulo and García-Díez (2009) and Angulo *et al* (2010) who try to explore male genital health through pieces of possible phallic art. This interpretation cannot be discounted out of hand, though scrutiny is required in selecting the objects used to form the data set for such analyses. The Montastruc example quoted in both sets of research, palart no. 554, is a broken perforated baton, covered in schematic salmonid depictions, and if the interpretation of a phallic depiction were to be accepted, has been depicted with four urethra, a detail not apparent from the published side profile photographs (fig 5.33.).

Figure 5.31.

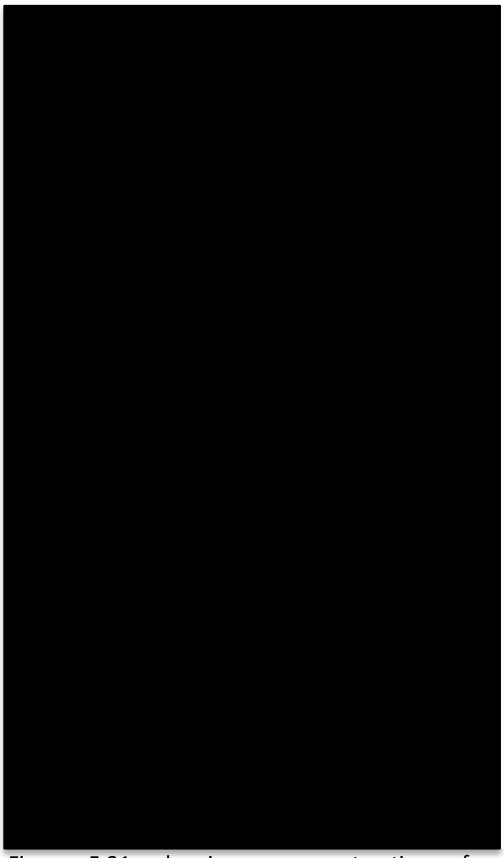

Figure 5.31. showing a reconstruction of a rondelle used as a thaumatrope by threading a string through the perforation and spinning it. Image after Azéma and Rivère (2012, 322).

Figure 5.32.

Figure 5.32. showing an example perforated baton from Montastruc. Scale in centimetres. Image: author.

Figure 5.33.

Figure 5.33. showing a decorated perforated baton. This has been interpreted as a phallus but the engraving of fish across the surface and multiple grooves to the tip are not consistent with this interpretation. Scale in centimetres. Image: author.

5.6.11. Contours Découpé

Figure 5.34.

Figure 5.34. showing a contour découpé from the Montastruc collection. Scale in centimetres. Image: author.

There is a single (0.096%) example of a contours découpé from Montastruc (fig 5.34.), a partially broken outline of the head of a horse. Contours découpé are typically made from the hyoid bone of a horse and in France almost exclusively depict horse heads, with the shape of the bone naturally suggesting the shape of the head (Conneller 2011, 35). Contours découpé were likely worn as pendants, with some examples displaying perforations that could be used for suspension (Conneller 2011). The distribution of this highly specific form is mostly concentrated around the Pyrenees (Conneller 2011, 34). The presence and quantity of this object type is significant. A single example may suggest Montastruc is not a production site for contours découpé, despite a proliferation of other decorated objects at the site. This is supported by ancient breakage, suggesting the object is in the advanced stages of its life history rather than freshly manufactured. As the form of the contours découpé and element used are so specific, it seems probable that there is a connection between Montastruc and those other sites with such objects, including major aggregation sites such as Mas d'Azil and Isturitz to the west. This further supports a pattern of long distance mobility, connection between sites and possible exchange.

5.6.12. Pendants

There are five (0.48%) pendants from Montastruc (fig 5.35.). three appear to be reduced, polished and perforated cervid teeth, 1 is a perforated scallop shell of coastal origin (Ladier *et al* 1994, 208). Similar pendants made from teeth were recovered from Courbet cave

Figure 5.35.

Figure 5.35. showing a bead made from oyster shell from Montastruc. Scale in centimetres. Image: author.

(Ladier *et al* 1994, 199) and have been found as grave goods from the burial at Paris-Saint-Germain-la-Rivière (Vanhaeren and d'Errico 2003; 2005; figure 5.37.). The connection between these artefacts across sites, and their discovery in burials, perhaps speaks of their significance in Magdalenian society. Beads have been hypothesised to indicate connection between groups, with sites displaying similar beads indicating elements of a shared cultural

Figure 5.36.

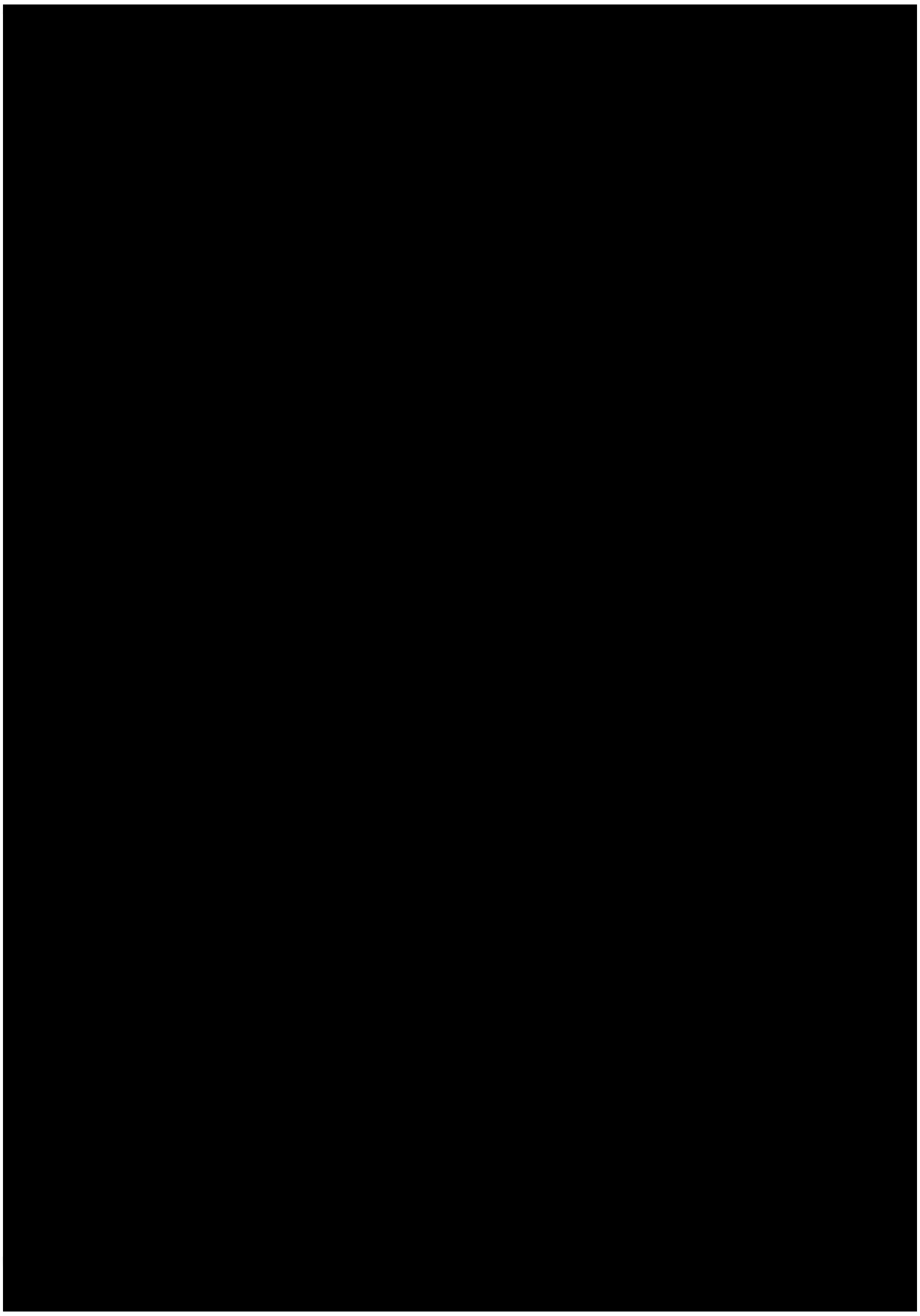

Figure 5.36. showing an example bead from Saint-Germaine-la-Rivière. Image after Vanhaeren and d'Errico (2003, 31).

practice, implying a degree of connection (Vanhaeren and d'Errico 2006). They also imply some type of fibre technology to string the beads or attach the beads to clothing.

There are two techniques evident in the creation of tooth pendants, based on cutting or boring the perforation. The cutting technique gouges a perforation into the root of the tooth via cutting into the root along its length. The boring method uses a rotational action to create a smaller perforation. The former creates a less neat perforation while the boring technique creates a neater perforation. There are perhaps parallels between the production of needles and the very fine perforations required to finish the needle, often smaller than the perforation evident to the cervid teeth. The difference would be invisible once the beads were strung but this may be a further window into differential skill, evident at Montastruc across different tasks.

The presence of the scallop shell may suggest some degree of connection to the coast. There is good evidence for coastal exploitation in the Magdalenian and this find may support some form of coastal connection for the people living at Montastruc, whether directly or indirectly. While unworked, the presence of a single egg cockle (*laevicardium crassum*) is similarly significant, though it cannot be ruled out that it was sourced from a fossil source inland. The egg cockle can be found along the NW coast of France today and was likely available along the same coastline in the past. Other modes of technology, especially contours découpé, infer connection to sites to the west and this shell tentatively supports this view. This could suggest direct movement to the coast or indirect connection via exchange relationships with neighbouring groups who did have such access (Cook 2010, 46). Long distance mobility to the coast (e.g. Langley and Street 2012) and the exchange of marine products (e.g. Pétillon 2008; 2013) are both well established in the Magdalenian (see chapter 4).

5.6.13. Swimming Reindeer

Figure 5.37.

Figure 5.37. showing the swimming reindeer from Montastruc. The piece has here been refitted and connected back together. Image courtesy of the British Museum.

'The swimming reindeer' (fig 5.37.) is a unique piece of three dimensional sculpture made from the tip of a mammoth tusk, depicting two reindeer in a posture suggestive of swimming (Cook 2010). This piece has been described in detail by Cook (2010) and has been depicted before and after it was repaired in earlier publications (Peccadeau de l'Isle 1868, 221; Read 1902; Sieveking 1987a). It is significant in that it has no immediately apparent function and is the only art object recovered by Peccadeau de l'Isle to be made from mammoth ivory, a material that would have been increasingly rare in southern France from the Middle Magdalenian onwards. It was erroneously interpreted as a set of dagger handles by Peccadeau de l'Isle (1868, 221), an error replicated in the British Museum Stone Age guide of 1902 (Read 1902). The piece was originally found in two pieces but was later re-fitted, changing its interpretation accordingly. Cook (2010, 46) notes a possible linkage between this object and the site of La Vache, lying to the south of Montastruc, where a similar 'swimming reindeer' motif has been identified. It is possible this object can be used as yet further evidence for significant contact between sites in the Magdalenian world. In this case, Cook (2010, 46) suggests the same population might have been moving seasonally between different locales.

5.7. Plaquettes

Plaquettes can be defined as small, tabular supports that are flat enough to engrave on at least one surface (Sieveking 1987b, 1). Common materials used as plaquettes during the Magdalenian include stone, bone, antler and ivory (Sieveking 1987b, 1). Plaquettes typically feature engraving and painting (Sieveking 1987b, 2). Common designs include animals, (stylised) humans or simple abstract motifs, such as lines (Sieveking 1987b, 1). It is also common that they are found in a broken state, with evidence of being subjected to heat, typically deposited *in situ* and in groups on a site (Sieveking 1987b, 1, 94). As an object class, plaquettes typically receive limited attention, in part due to their complexity, with superimposition of depictions and faint engraving making them especially challenging to interpret (Sieveking 1987b, 2).

Appendix 8 provides a summary of Sieveking's (1987a) plaquettes findings in the British Museum collection catalogue, with figure 5.38. highlighting some example plaquettes from Montastruc. There are 51 published stone plaquettes in total, 2 on pebbles with unfinished perforations; 4 pieces with minimal decoration; 44 pieces with animal engravings, often multiple, and sometimes only parts of animals (Sieveking 1987a, 84); 3 marked by 'arrows' and 4 with abstract motifs Sieveking 1987a, 84). Jill Cook has subsequently discovered an additional plaquette in the British Museum collection (fig 5.39.). Bétirac (1952; fig 5.31.) also recovered plaquettes, though no comprehensive catalogue of his findings exists. Based on his summary publications (Bétirac 1952), they are consistent with those recovered by

Figure 5.38.

Figure 5.38. showing example plaquettes. Plaquette no. 668 (top left) shows a depiction of a horse in right profile, plaquette no. 691 (top right) shows a depiction of an ibex in left profile, and plaquette no. 688 (bottom) shows a depiction of horses and cervids in right profile. Scale in centimetres. Image: author.

Peccadeau de l'Isle, naturalistic and schematic animal designs, with ibex and aurochs numbering among the depictions, engraved on supports of limestone, likely derived from the site itself. Engravings were likely produced with burins, with changes in thickness and depth of line reflecting the differing angles and degrees of pressure to produce different effects (Cook 2010, 31). The shallow nature of the engravings may give some indication of their use, perhaps suggesting a certain immediacy, given they can be easily obscured as they age over a short period of time (Cook 2010, 49). Sieveking (1987a, 94) notes that the supports used to produce the plaquettes seems to be material sourced directly from the vicinity of the site, consisting mostly of weathered limestone. Sieveking (1987a, 94) reports

Figure 5.39.

Figure 5.39. showing a recently discovered plaquette from Montastruc. The plaquette depicts a possible horse in right profile. Scale in centimetres. Image: author.

that 11 waterworn pebbles have modified edges, 10 further examples are similar but display evidence of edge trimming, and 17 show breakage on all edges or have only one original edge remaining. When taken together, this pattern of edge modification is taken to suggest that the shape of the support may have been significant and perhaps reflects an aesthetic, with a preference for trapezoidal or pentagonal forms (Sieveking 1987a, 94).

There is a trend in this assemblage to depict naturalistic forms, indicative of a detailed knowledge of the seasonal appearance and anatomical specifics of a range of species (Cook 2010, 38). Sieveking (1987a, 95) suggests that 75 animals are depicted in total, engraved across 43 plaquettes, consisting of 39 horse, 7 ibex, 7 reindeer, 6 red deer, 5/6 bison, 3 chamois, 1/2 humans, 1 ox, 1 bird, and 1 wolf. These depictions are often superimposed, appear in multiples and, when considered as a collection, demonstrate a variance in skill (Cook 2013, 248). Bétirac (1952) refers to these pieces as ‘sketches’, noting some of the designs were incomplete or missing body parts. He used these features to support his position that there was a difference in skill present between the making of some of the organic pieces, such as the horse spear thrower, and the plaquettes, with the latter indicating a less skillful execution than the organic pieces. The majority of the plaquettes, based on the stylistic attribution of depictions, can be attributed to Magdalenian IV (Sieveking 1987a, 84), and due to the homogeneous nature of the assemblage, were likely made and deposited in situ as a collection (Sieveking 1987a, 158).

5.8. Chapter Summary: Building a Context Frame for a Specific Re-Analysis of Plaquettes from Montastruc

Chapter 4 explored the Magdalenian in a broader context to facilitate the creation of a contextual frame around the discussion of the full artefact assemblage from Montastruc. In turn, the specific analysis of artefacts from Montastruc go some way to providing a sense of the type of site Montastruc may have been, as well as the types of activity that occurred there, enhanced by a broader awareness of the Magdalenian lifeway. This is an important foregrounding to the approach to art espoused in chapter 3, in which the object biography of art is explored within a specific context.

The evidence considered would suggest Montastruc was likely a seasonal base camp. An extensive and varied lithic and faunal assemblage, with supporting organic objects, point to a strong signature of hunting at the site, primarily but not exclusively of medium sized ungulates, but also a host of smaller prey, including birds and fish. This latter category, along with associated evidence for fishing equipment, further suggests periodic exploitation of marine resources, perhaps during the seasonal salmon run in the river Aveyron, directly proximate to the site. The presence of birds and small mammals further suggests a broad exploitation strategy during Magdalenian IV. The number of bladelets and completed tools at the site, along with cores, suggest primary knapping, supported by the presence of organic debitage and grinding stones for creating needles and points. A high rate of ancient breakage in hunting technology suggests the use of this equipment, with its discard after recovery of the wooden haft. Traces of heating/burning on many plaquettes imply the presence of hearths at the site, as does the description of Bétirac’s layer V, though the size and structure of the hearth(s) are difficult to reconstruct. These features would in turn make the presence of some form of structures at Montastruc likely, perhaps tent-like shelters made from organic materials and sewn skins.

Based on the evidence for the manufacture of hunting equipment, Cook (2010, 48) has suggested the site was likely occupied in summer by several families (Cook 2010, 44, 48), perhaps ranging south following reindeer herds over short migrations (Cook 2010, 45). This movement is perhaps supported by the presence of perforated coastal shells at Montastruc, as well as tooth pendants, contours découpé, and a deer faun and bird spear thrower, which all suggest connections to other sites within the landscape. Montastruc may have been connected to sites in the west, such as Mas d'Azil and Isturitz, and to La Vache in the south. The presence of a large quantity of art at the site, much of it made *in situ*, suggests protracted stays and that the site may have been a significant place in the landscape. The differential skill exhibited in the art suggests a diverse range of occupants at the site rather than a specialised task group.

Chapter 6. Engraved Stone Plaquettes: Selecting Materials

Chapter 6. Engraved Stone Plaquettes: Selecting Materials

6.1. Introduction

When considered through the lens of a relational and animistic ontology, many of the choices made in the process of making, using and depositing stone plaquettes are revealed to be rich in significance. The discussion of the life history of stone plaquettes is the focus of the next three chapters. Chapters 6, 7 and 8 should be taken as a flowing continuation and are somewhat arbitrarily separated, for convenience, into broad phases of the life history of the plaquettes from Montastruc. Chapter 6 focuses on the selection of material that was used as a support for the engraving. Chapter 7 moves on to consider the engravings themselves, how they were composed and the addition of colour. Chapter 8 shifts attention to how the plaquettes were used after they had been engraved, exploring the complex relationship between plaquettes and fire, before eventual deposition. At each broad stage, a comparison with the organic art from Montastruc will be outlined, at the same stage of the life history, to provide a contrast, as well as being of interest in their own right. The separation between these chapters is noted as an arbitrary one as it will become apparent that there are strong themes of connection and shaping influences that flow across these phases. These chapters are the culmination of the bringing together of the theoretical and technical insights considered in chapter 3 and the situating of that approach within a Magdalenian (chapter 4) and site (chapter 5) context. Interpretations are derived from extensive direct observation of the Montastruc collection, with supporting object descriptions of each object discussed, or series of objects discussed, within the appendices, which support the interpretations made. The appropriate appendix is highlighted as a specific object or series of objects is discussed.

An object biography encourages a deep reading of material cultures and an expansive interest in materials. The chapter begins by exploring the properties of limestone, which in turn inspires many of the observations about how the limestone used to make plaquettes was selected. The material selected for the manufacture of plaquettes can be understood to have been active in the process of creating the engraved form, through the incorporation of evocative details in its shape and surface morphology. The weathered nature of selected stone is considered and is argued to have been meaningful in the process of material selection. To contextualise choices made in relation to a specific material culture set, some consideration of the choices made in relation to decorated bone and antler pieces is presented at the same phase of object life history: material selection. In so doing, it is apparent that there were points of cosmological resonance between the collection of antler and the collection of stone. A component part of this resonance was the close association between the colour of shed antler and the colour of weathered limestone, which may have softened the categorical divide between them. Some of the bone pieces add to this picture by the specific way in which they were sourced, having been manufactured from fragments of evocative pieces of long bone, fractured to extract marrow, with the shape incorporated into the artistic form. Taken together, a case is made that materials were active at Montastruc, often with natural features worked into the final art form. Through this process of 'listening' to the material, a case is made for an understanding of materials as gifted through relations with animals and natural landscape features, mirroring those processes observed in contemporary hunting and gathering populations, discussed in chapter 3. This interpretation derives from the evidence for the selective use of materials that were naturally shed; both through freeze thaw action from the rock shelter surface in the case of limestone, and from the heads of reindeer in the case of antler.

6.2. Some Attributes of Limestone, With Reference to Montastruc

Exploring the relationality and materiality of engraved stone plaquette production necessitates a deep analysis of the materials used (Hodder 2012). As discussed in chapter 3, materials are rarely raw (Conneller 2011), but can instead be understood to be an active part of human/thing engagement, shaping the outcome of that engagement symmetrically with humans. Attributes including colour, texture, hardness, inclusions, or behaviour under thermal variance, can all shape the nature of the dialogue between humans and materials. As such, this chapter begins with a consideration of the properties of limestone in general, and from the specific regional context of Montastruc and the Aveyron valley in particular that played host to the manufacture of engraved stone plaquettes.

In exploring limestone, the regional setting is briefly outlined, before considering the more general properties of limestone. The dramatic cliffs flanking the river Aveyron are part of a deep valley system cutting into a limestone plateau, around 200 metres above sea level, to the north east of the Tarn-et-Garonne department to the south of central France (fig 6.1.). This limestone plateau is of Jurassic age and forms a part of the Massif Central. The limestone selected for engraving at Montastruc was almost certainly sourced locally, likely

Figure 6.1.

[redacted]

Figure 6.1. showing the geology of the Aveyron valley in the direct vicinity of Montastruc. The location of the network of sites that includes Montastruc is marked by a red circle. The site is position below steep limestone cliffs of Jurassic age that have been cut by the river Aveyron. Image courtesy of the Bureau de Recherches Géologiques et Minières.

from the immediate vicinity of the site itself, and is of the same type as the surrounding cliffs (Sieveking 1987a). In its unweathered state, this limestone is of a deep grey colouration; in its weathered state, the colour can vary from a light yellow, to deep orange or drab brown, with individual pieces of weathered limestone often showing a range of colour across the same block. Limestone typically forms in gentle, warm, marine conditions as a result of the gradual accumulation of biological detritus, typically the skeletons of microfauna or the shells of larger sea creatures, forming into a solid sedimentary mass through a combination of time, anaerobic conditions, and pressure. All limestone is united by a majority composition of calcium carbonate ($CaCO_3$), typically in the stable form calcite, with the remaining composition being more variable, linked to the specific conditions of formation (Greensmith *et al* 1971, 191). Limestone can be characterised as a relatively soft sedimentary rock, falling between 3-4 on the Moh's hardness scale, with variation based on the specific composition and context of formation. The specific physical characterisation of limestone at Montastruc could not be undertaken, as this would damage the artefacts. However, Montastruc limestone will likely fall within these broad criteria. The specific sub-type of limestone can be challenging to establish due to its propensity to erode. This makes the composition and texture significant in any attempts to classify a particular sample (Greensmith *et al* 1971, 193). At Montastruc, the limestone is of a fine grain size but with clear, relatively common marine fossil inclusions. Using Folk's classification system, which relies on the assessment of composition and texture, the fine matrix and presence of shell bioclasts identified in the Montastruc limestone most readily accords with the description of a biomicrite, defined as a micrite with over 10% shell inclusions (Greensmith *et al* 1971, 208). Biomicrite forms in sheltered and calm conditions where the lime mud component is deposited with little to no disturbance and entire shells can be preserved without breakage, presenting as fossil inclusions within the limestone (Greensmith *et al* 1971, 208). Without high powered microscopy or thin sectioning, and only the limited capacity to assess fresh surfaces in the form of small accidental breaks sustained in the last 150 years, a more specific definition can't be made with absolute certainty for the engraved limestone pieces from Montastruc.

Limestone was an important material at Montastruc. It was the dominant stone used as a support for engraving, with 48 examples (90.57%). Only five examples (9.43%) were made on other types of stone despite plentiful alternate materials being available. For example, weathered pebbles would have been abundant from the bed of the river Aveyron, including exotics transported over long distances by the river. However, despite these alternatives, it was local, weathered limestone blocks that were chosen and dominate the assemblage. The choice of limestone as the primary material for engraving is perhaps unsurprising as it is relatively soft, easy to work, and was locally abundant. However, it was only a specific sub-type of limestone that was selected for engraving. The limestone blocks selected were typically around the size of the palm of the hand, with some

Figure 6.2.

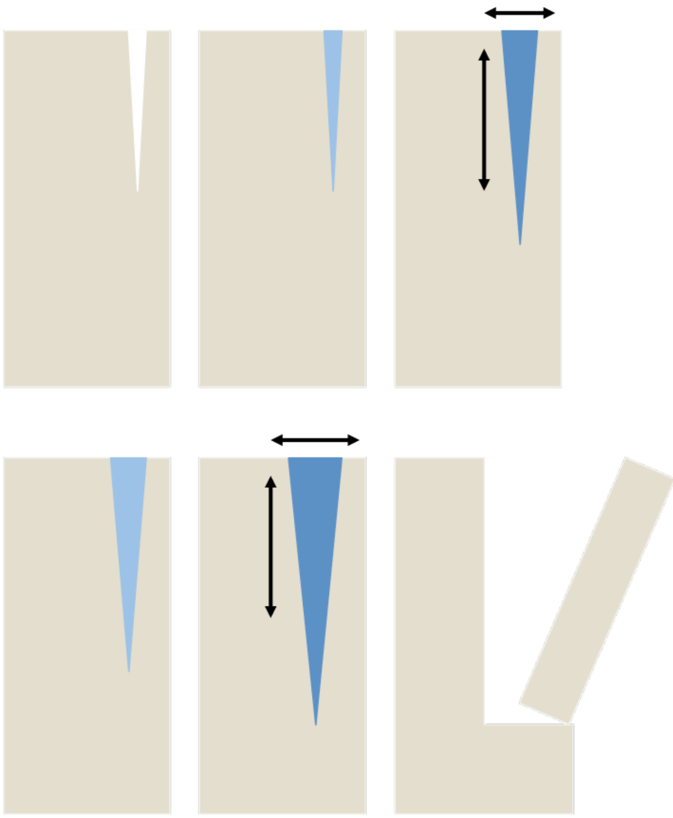

Figure 6.2. showing a schematic depiction of freeze thaw action. A pre-existing crack in the limestone (top left) fills with water (top centre), the water freezes and expands (top right), causing the crack to widen. The cycle is repeated, with the now wised crack filling with water (bottom left), then freezing and expanding (bottom centre), further expanding the crack before it eventually leads to the complete detachments of the limestone (bottom right). Image: author.

variance present, such as no. 661, which is 380mm long in maximum dimension. All of the pieces show evidence of weathering in the form of well-rounded edges and a change in colouration from the native grey to yellows and browns. Based on the distinctive morphology of some surfaces, the majority of pieces have likely been subjected to freeze/thaw action. Freeze/thaw is a weathering process in which water enters into cracks and joints within a stone, freezes due to a change in temperature, expands as it crystallises into ice, forcing the cracks to widen due to the same mass of water occupying a larger surface area. The repetition of this process will eventually detach a block from the parent rock (fig 6.2.). The weathering of blocks in this fashion may have been semi-predictable, perhaps being more frequent across different seasons with changing climatic conditions. Freeze/thaw blocks were likely intentionally selected for engraving. Does this pattern of selection provide a window into the meeting of ontology, cosmology and appropriate material selection?

6.3. Problematising Limestone at Montastruc

The local abundance of limestone and its softness made limestone a suitable choice as a support for artistic depiction. These practical and pragmatic considerations are likely significant to any interpretation of the selection of limestone material at Montastruc, and indeed other sites. Most accounts of art would consider this functional assessment a sufficient consideration of the *raw* material. But what if the material was more than raw? It is the contention here that these attributes alone are insufficient to fully account for why limestone was used to such a degree, how blocks were selected, or how limestone was conceived and understood as a material and how this shaped subsequent action. Those practical properties are only a component part of a broader and equally significant set of attributes that likely shaped human action at Montastruc. It is argued here that limestone was more than these basic attributes; it was the foundation and an active shaping influence in human/thing engagement in the creation of art at Montastruc. Art begins with the material and its selection, not when flint contacts limestone and marks are made. As such, the limestone might have been understood to be as much a part of the art as the marks made on its surface. In this framework, the appreciation of the art is in part contingent on the understanding of the limestone. The attributes of the limestone blocks from Montastruc are explored anew, using the theoretical framework outlined in chapter 3 as a lens to explore limestone and its properties in greater detail. These properties are contextualised, exploring how they shaped and facilitated human action within the domain of art production.

The use of limestone can be understood as an active choice amongst viable alternatives. Even with favourable properties that would make limestone a suitable material for engraving, its use was not inevitable, it was actively chosen. Four of the five non-limestone pieces displayed varying degrees of edge roundness. This is likely the result of erosion through water action, suggesting they were sourced from the river Aveyron, which ran directly adjacent to the site. The river would have been a constant and abundant source of potential materials for engraving (fig 6.3.). The final piece, no. 710, is a small, unique piece

Figure 6.3.

Figure 6.3. showing non-limestone engraved stones, pal art no. 708 (1), no. 709 (2), no.710 (4), no. 700 (3), and no. 702 (5). Many of theses pieces (1, 2, 3, 5,) show rounding consistent with water transport. It is likely that these pieces were sourced from the river Aveyron, immediately proximate to Montastruc. Suitable alternative materials were available to limestone at Montastruc, yet weathered limestone blocks were chosen as the dominant material for engraving. Image: author.

of shaped calcite, likely a fragment of a stalactite. The presence of non-local stone transported to the site and knapped to make tools, and sandstones for shaping organic tools, evidences a capacity to transport non-local stones to the site. It is conceivable that non-local stones suitable for art production could have been transported in a similar fashion to the site, but they were not. The preferential use of limestone based on mechanical properties seems insufficient to fully account for its selection, given the presence of viable alternatives that shared these properties. This is perhaps supported in how different types of stone were used for different types of art, suggesting their specific properties might be structuring their use.

A review of non-limestone stone highlights these differences. Utilised river pebbles are of two types. The first is elongated and well rounded, represented by pieces no. 708 and no. 709. Deep pits on the surface evidence an attempt to perforate these stones, likely with the intent to use them as pendants. The attempts to perforate, via a rotational, biconical action, were abandoned shortly after efforts had commenced, the material seemingly too hard to be perforated by flint tools, though it was soft enough to superficially engrave. There are several more examples of such stones found at the site, some of which have been collected and, now stored with the stone tool assemblage. While these stones conform to the shape of worked pieces there is no clear evidence that they themselves have been subject to anthropogenic modification. It is possible that they have been transported by humans as blanks, with the intent of working at some later time, but natural transport via water action during periods of flooding at the site cannot be ruled out.

The second type of material, pieces no. 700 and no. 702, is thin, laminated but relatively cemented, and presents in diamond shaped fragments. The pieces have been reduced, evidenced by their jagged but rounded edge profiles. This likely suggests that the pieces were broken and have been subject to water action, which has rounded the breaks. There is no evidence there was an attempt made to perforate these pieces, though they would likely have been more readily perforated than the rounded pieces that were chosen for perforation. The final piece of non-limestone, a fragment of calcite, has been sculpted in 3D to create a schematic human form, elaborating a naturally suggestive shape into a characteristically Lalinde-Gönnersdorf type human profile.

This pattern may indicate an aesthetic at work, with some pieces deemed suitable for adornment while others were not, based on shape, visual appearance, texture and perhaps capacity to hold an engraving. The engraving of these pieces is more akin to that seen in some organic pieces. There are no animals depicted on any of the non-limestone pieces, in sharp contrast to limestone plaquettes. Instead geometric patterns have been engraved, and in the case of no. 708 this was added after the failed attempt to perforate the piece. While made on supports of different types of stone, non-limestone art is dissimilar to limestone art and there is significant difference within the stone assemblage, to the degree that a rigid category grouping objects by material may be too coarse. Evidently, only specific types of stone were used for particular types of activity, perhaps suggesting that the humans occupying Montastruc were sensitive to the properties of materials and that these properties were active in the selection of materials.

The shape of the limestone selected, and how the block arrived at that shape, provides further insight into the nature of material selection at Montastruc. Sieveking (1987a) claimed that many of the limestone blocks, on the grounds that some edges were angular, might have been subject to anthropogenic breakage prior to engraving to control the shape of the piece. However, reanalysis revealed little supporting evidence for any significant shaping of the blocks once they were selected. No clear tool marks were evident that might indicate shaping or intentional breaking. Perhaps more likely, the angular shape of blocks can be attributed to freeze/thaw action, leading to exfoliation of blocks from the rockshelter surface. Other breaks are demonstrably later than the phase of engraving, with the engravings disrupted by the breaks, many of which have likely been caused by anthropogenic thermal modification, discussed further in chapter 8 (Fig 6.4.), or recent damage caused during excavation (fig 6.5.). Furthermore, only limestone blocks detached from the rockshelter via natural erosional processes seem to have been selected for use in the creation of plaquettes. This would appear to be an active choice rather than a technological incapacity to exploit a rock outcrop. For example, evidence from the site of Roc-aux-Sorciers, France, suggests that stone tools were used as chisels to modify the cave wall surface in the creation of bas relief animal depictions (Beyries and Cattin 2015; fig 6.6.). The macroscopic analysis of stone tools at Montastruc did not reveal any examples that displayed the characteristic wear associated with such working or any specialised tools that might be employed for such a task. Equally, fire might have been employed to detach limestone from the cliff, with the rapid heating and cooling of rock often causing thermal

Figure 6.4.

Figure 6.4. showing the reverse of plaquette no. 678. The plaquette is a small thermal spall derived from a larger engraved plaquette. The characteristic, steep 'steps' (bottom left, highlighted by shadow) and rough surface texture is indicative of thermal spalling rather than a clean break derived from, for example, the application of a directed blow. Scale in centimetres. Image: author.

fracture that in this case would result in the creation of limestone blocks. However, the plaquettes reveal evidence only of heating and burning *after* engraving, discussed further in chapter 8, suggesting this strategy was not employed. Humans in the Magdalenian were technologically capable of detaching limestone blocks from solid rock, whether through the use of fire, stone tools or a combination of both, to meet particular artistic requirements. Yet at Montastruc, humans instead actively chose to work with weathered blocks that, based on size and shape, constrained the range of art that could be produced. Equally, they might have chosen to modify the shape of the weathered limestone block but instead actively chose to work with the native shape of the block rather than imposing a shape on the support.

The collection of weathered limestone blocks detached via freeze/thaw was one possible choice amongst many but seems to have been significant to the artists at Montastruc.

Figure 6.5.

Figure 6.5. showing the reverse of plaquette no. 668, evidencing excavation damage in the form of linear impact impressions, or tool marks, leaving a vibrant white scar on the otherwise weathered limestone surface. A blow of sufficient force could readily fracture a plaquette, probably accounting for some of the historic fractures in the plaquette assemblage. Scale in centimetres. Image: author.

Furthermore, the artists, despite being technologically capable of imposing form, respected the shape of the block. This lack of modification does not reflect a technological inability to shape the blocks but rather an active choice. As discussed fully in the next chapter, the engravings on the surface of the limestone supports often incorporate aspects of the shape and surface morphology of the block. The native shape of the material appears to be active in that, to a variable extent, it inspired the subsequent art produced. Whether based on some element of shape, colour, texture, or morphology, the material seems to have played an active role in the engraving that was produced. Several examples will serve to highlight aspects of this relationship to the material. Plaquette no. 679 (fig 6.7.) is a small, weathered limestone plaquette, rounded and with several weathered chips across the surface that have modified the morphology of the support. An animal has been engraved in left profile with neck bent at a low angle and outstretched. The species of this animal has

Figure 6.6.

[redacted]

Figure 6.6. showing an example stone tool from the site of Roc-aux-Sorciers, France. The tool was used as a chisel in the creation of bas relief art, evidence by distinctive chipping to the proximal end of the tool. These distinctive traces are macroscopically observable but were not readily observed during macroscopic analysis of the Montastruc stone tool assemblage. Image after Beyries and Cattin (2015, 266).

been rendered somewhat ambiguous due to the loss of the head, likely the result of a later, natural break. Sieveking (1987a, 88) reports that the body proportions, especially the hind legs, do no match the broader body plan of a probable bison. The limestone block in this case can be seen to be very much active in the morphology of the depiction. The overall

Figure 6.7.

Figure 6.7. showing plaquette no. 679, featuring a probable bison / possible bear in left profile. The head has been lost due to an ancient break, rendering the ultimate species identification of the animal depicted ambiguous. It is likely the engraving has been influenced by the evocative shape of the support. In particular, the top edge (top centre) has been used to depict a hump, characteristic of bison, by incorporating the natural flake scar as the dip of the back after the hump. The left of this flake scar, the line of the neck mirrors the line of the edge of the block, and to the right, the line of the back similarly mirrors the edge of the material. The flank and rump are composed by the active incorporation of the edge of the plaquette, as they are now demarcated by a line. This incorporation of natural features is a common trend in the plaquettes from Montastruc. Scale in centimetres. Image: author.

form of the block is suggestive of an animal with outstretched neck and head lowered, reflected in the resultant form that has been depicted. Furthermore, a natural weathered flake removed from the middle of the upper edge of the block has been used to demarcate the rise in the back profile where the shoulder begins, creating a hump-like effect. The line of the rump drifts into the edge profile of the block, with the edge of the block being incorporated seamlessly into the animal profile to act as the upper edge of the rump and tail. The shoulder and neck closely follow the line of the edge of the block before a sharp line deviates from this trajectory to leave room for the head, now lost. In this case, it is a reasonable summation that these morphological features of the material have shaped the drawing strategy employed, enhancing the subsequent animal form.

This effect can be seen yet more clearly in plaquette no. 658 (fig 6.8.), a relatively well-rounded limestone block, with breaks leaving some angular edges. The form is suggestive, with the change in angle of the upper edge reminiscent of the line of the back of an animal.

Figure 6.8.

Figure 6.8. showing plaquette no. 658, depicting a bison in right profile. The photograph has been taken from a ¾ profile, which reveals that the head of the bison is wrapped around the edge of the limestone block. When taken alongside the naturally evocative shape of the block, which summons up the lines of the head, neck and back of an animal, this effect provides a sense of depth. The animal has been depicted in a charging posture, enhanced by the shape of the lock and wrapping the head around the edge, giving the animal depicted a sense of dynamism and movement. The artist likely intended this effect, using the evocative shape of the block in part to achieve it. Image: author.

This feature has not escaped the attention of the artist, who has incorporated this feature into an adult bison depiction in right profile. The positioning of the legs gives some sense of dynamism and movement, with the back legs pulled forward, perhaps reflecting an animal in mid stride, moving at pace. The head has been depicted to slightly fold around the edge of the limestone block to which it is most proximate. This seems to have been entirely intentional. When the block is viewed in three quarter perspective, rather than flat as in a typical photograph, the animal springs to life, the wrapping of the head around the edge of the block acting in tandem with the shape of the block to give the animal a sense of depth and dynamism, enhancing the sense that the bison is mid-charge and springing forth from the rock. The fusion of artistic flair and working within the affordance of the limestone block, its native and suggestive shape, has produced a result that would be less dramatic if either were found in the absence of the other.

Plaquette no. 675 (fig 6.9.) highlights elements of this same pattern, but adds an additional dimension that blurs the boundary between 'natural' and 'cultural'. No. 675 is a small, angular piece of limestone, with differential colouring across the support indicating contact with heat. The projecting edges to the right that come together into a broad and angular point may have inspired the depiction of a bovid in right profile, relatively crude and schematic in its depiction, with a projecting neck and head filling the space. A schematic horse depiction has also been engraved in right profile. Here a natural crack projecting from the top edge and running down through the centre of the piece has been taken as the line of the front leg and projected down with an engraved line almost to the bottom edge of the support. The lines of the back follow the edge profile of the material, working around this crack to proportion the animal. The ear of the bovid, anatomically irregular in execution, is used to represent both the ear of the bovid and the head of the horse. The line of the back of the bovid is engraved to form a deep groove, serving as both the back of the bovid and the abdomen and chest of the horse. Here the previously depicted form of the bovid acted as a shaping influence on the formation of the horse, in much the same way as did the limestone block in the engraving of the bovid and the front leg of the horse. The recognition of a pattern of engraving animal forms to respect and incorporate aspects of the morphology of the limestone block facilitates a deeper analysis of blocks which feature multiple, interacting animal forms, where much the same logic seems to have been employed between engravings.

Figure 6.9.

Figure 6.9. showing plaquette no. 675, depicting a horse and bovid, both in right profile. Attributes of the bovid, including the ear and back, have been incorporated into the engraving of the horse. The horse has been composed around the evocative edge profile of the limestone block, that evokes the lines of the back of an ungulate, as well as a crack (top centre) that runs from the top edge that has been used as the line of the front leg. This plaquette shows the conceptual linkage between the incorporation of natural features and cultural features to create further engravings. Scale in centimetres. Image: author.

As these examples highlight, it would be false to see the material as 'raw' in art production at Montastruc; it instead seems to have been an active shaping influence on the engraving produced. This pattern of incorporating existing morphological features of the limestone into the art being produced seems to have extended into the melding of animal forms already depicted with newly depicted animals forms, bringing into question the strict division between the 'natural' stone and 'cultural' engraving, instead demonstrating a more pervasive concern with affordances and constraints offered by existing forms. The theme of incorporating natural rock features into engraving or painting has also been identified in some parietal art and has received growing attention (e.g. Bégouën and Clottes 1991; Hodgson 2008, 346-347; Pettitt *et al* 2014; fig 6.10.). The finding of a similar pattern at Montastruc resonates with this growing appreciation in other art in the

Palaeolithic. This tendency to incorporate natural features into art has been interpreted as a significant component of Palaeolithic cosmology. The rock has been argued to have been understood as a place where animals resided, or perhaps even a semi-permeable membrane through which animals could pass from another world (e.g. Clottes 2004, 2005, 2016; Lewis-Williams and Clottes 1998; Porr 2015). The recognition of this pattern beyond plaquettes and in other types of art implies that it was an important, recurring theme, structuring how art was made. It perhaps also confirms that cosmology was an active, shaping influence in the making of plaquettes, structuring choices in their production and use.

Figure 6.10.

Figure 6.10. showing an example of the incorporation of natural features into artistic depiction from the site of Altxerri, France. In this case, a projection of rock that resembles a bird has been completed with engraving to create a bird depiction. Image after Robert (2016, 3).

6.4. Exploring Cosmology at Montastruc: Limestone as Animal-Rock

These choices are perhaps only comprehensible within the broader context of activity at Montastruc to create some sense of context through comparison, and a wider sense of how materials intertwined with cosmology. The material affordances of limestone are considered in relation to the social and technological strategy surrounding its working. It would seem limestone was cosmologically significant, but it might also have been socially significant. It is suggested that a different ontological conception of material categories played out through the plaquettes, reflecting mutability in how humans, animals and objects were defined. Two attributes of limestone are considered as examples that encourage the rethinking of the strict categorical boundaries between material categories: the presence of fossils and colour.

In social terms, the selection of limestone as a material is potentially significant. Limestone was available in relative abundance, with little to no transportation cost, and is soft and easy to mark with flint tools. It thereby posed no barrier to the creation of art based on skill or privileged access to material linked to rarity. As a common and easy to work material, most anyone could in theory produce art with this material, though the resultant quality would no doubt vary between artists of differing skill. This is reflected in the plaquettes, which were executed with a diverse range of skill, implying authorship by a number of artists. This latter point will be fully explored in chapter 7. This pattern stands as a marked contrast to, for example, the flint knapping practices identified by Pigeot (1990) at the site of Pincevent, discussed in chapter 4. At Pincevent, access to flint nodules of a large size was constrained by the degree of skill and experience one possessed, with the largest cores - rare to source, costly to transport and difficult to work - correlating with reduction by knappers with the greatest experience. The social and the material were revealed as linked, with different practices reflecting the acquiescence to the demands of different materials through the adoption of flexible social strategies in different contexts. The properties of the material, rare, hard to work and expensive to transport due to its weight, shaped the social strategy employed in its working, with access only given to the most experienced. The working of limestone at Montastruc was, by contrast, seemingly egalitarian, with a wide participation by artists exhibiting a range of skill, facilitated by ease of working and low transport cost, and the materials being naturally evocative of animal forms that could be readily completed by an artist, rather than composing the animal entirely independently.

A cosmologically infused logic might encourage seemingly stable attributes of the world to be understood in quite novel and distinct ways. Conneller (2011) has discussed the importance of material properties in the Palaeolithic, highlighting that their manipulation can lead to the creation of novel connections and relationships between materials. Of particular interest was the creation of ivory skeuomorphs of shells, with ivory pendants shaped, engraved and polished to resemble the qualities of shells (Conneller 2011, 72). Here, a shared lustrous quality between the inner surface of shells and the polished sheen of ivory facilitated a connection that allowed ivory to substitute for shell when the latter was unavailable, evidencing a degree of categorical fluidity between materials and how they were conceived (Conneller 2011, 72). This insight is potentially pertinent in the consideration of the fossiliferous limestone from Montastruc. The presence of fossil shells within the matrix of the limestone at Montastruc may seem trivial, perhaps warranting no more than passing commentary. However, in a different cosmological system where ontological fluidity was common, it might offer a significant routeway into a deeper understanding of how limestone was understood at Montastruc and why it was subject to such specific and careful selection. To the contemporary archaeologist, fossils can aid in assessing how the stone was formed and its quality for different tasks, such as engraving. To the Palaeolithic artist, their presence may have been much more significant and challenging: how did an animal come to reside inside the rock? As discussed in chapter 4, marine resources constituted a non-trivial dietary resource to humans during the Magdalenian (Adán *et al* 2009; Rillardon and Brugal 2014) and the modification of shells to be used as beads was commonplace (Vanhaeren and d'Errico 2003). As discussed in chapter 5, a perforated oyster shell was recovered from Montastruc, along with the unmodified shell of an egg cockle, suggesting an awareness of marine resources and perhaps some degree of connection to the coast, even if only indirectly. Fossils were demonstrably a source of interest during the Palaeolithic, as discussed by Oakley (1965a, 1965b) and more recently by Conneller (2011). For example, a trilobite fossil was perforated and used as a pendant at the Magdalenian site of La Grote du Trilobite (Oakley 1965b, 121), while a fossil shark tooth found in the Magdalenian layers of the French cave site of Isturitz was similarly perforated for suspension (Oakley 1965b, 122; fig 6.11.). Odin *et al* (2006) recount an example of the active preserving of fossils within stone tools reflected in knapping choices, evidencing this interest even in what are typically described as 'functional' tools. This poses a significant ontological challenge when trying to reconcile the dual form of shells, on the one hand as once housing animals in marine locales, a source of nourishment and decoration, and possessing attractive qualities such as

Figure 6.11.

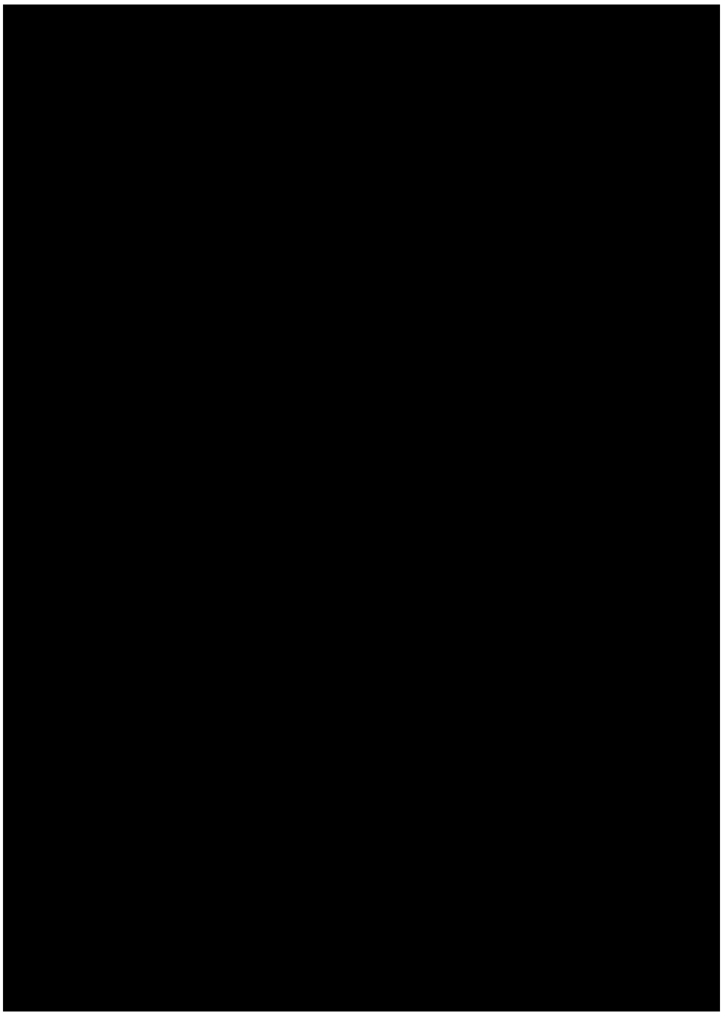

Figure 6.11. showing an example of a fossilized perforated shark tooth pendant from Isturitz, France. Image courtesy of Image courtesy of Musée Archéologie Nationale.

lustre (Conneller 2011, 72), while on the other as an integral part of the rock matrix in sites sometimes vast distances from marine locales, with the same recognisable form but very different properties. In turn, this perhaps encouraged the questioning of the ontological status of animal and rock, with limestone sitting somewhere in the middle of these categorical distinctions by virtue of physically evidencing the presence of animals in the rock: animal-rock.

A similar conception can perhaps be extended to the colour of the limestone encountered at Montastruc. Colour is an attribute that is typically given little attention, perhaps construed as of minimal interest, but a growing body of work is demonstrating the value in exploring colour in diverse archaeological contexts (e.g. Gaydarska and Chapman 2008; Jones 2004a, 2004b; Walker 2015). Taçon's (1991) ethnographic account of lithic provenancing amongst the Australian Aborigines is thought provoking. Taçon (1991) reports that colour is the primary attribute considered in the selection of materials for making tools. The colour red is especially highly valued, symbolically linking the material to blood, and blood linking the material to the intended task of killing, increasing the potency of the resultant tool (Taçon 1991). This is such an integral component of material selection that technically inferior, poor quality material will be selected, and from further away, if it matches the desired property of an intense red colour, even if there are superior materials available closer to the site that would be more efficient to transport (Taçon 1991). Colour can be a strong shaping criterion in the selection of materials and its subsequent use.

Might colour be an alternate way to organise the world beyond mineral or organic composition, physical or chemical properties? This notion must at least be entertained when trying to order the Magdalenian world. It is perhaps significant that weathered limestone was selected for artistic depiction at Montastruc, while unweathered limestone was not. The colour of the Montastruc limestone in its weathered state, a bleached yellow to light brown, is perhaps reminiscent of antler, a material that was itself significant in art production at the site. Colour will be a significant and recurring theme in chapters 7 and 8, in discussions of painting and burning respectively, as a property that was manipulated repeatedly at different phases of the life history of the plaquettes.

6.5. Further Contextualising Choice: A Comparison of Stone and Organic Art at Montastruc

The possible linkage between the organic and inorganic, animal and rock, invites a consideration of the organic art from Montastruc. Exploring a parallel pattern of art production, elucidating points of difference and connection in the object biography, has the potential to aid in the further elucidation of choices made in the selection of materials for the creation of art, as well as their potential significance. This theme of comparison can be applied to all stages of the respective life histories of stone and organic art and is taken up again in both chapter 7 and chapter 8.

The Montastruc organic art assemblage reveals points of divergence and connection with the plaquette assemblage. The organic record is appreciably more variable in the types of art depicted, perhaps in part because it is derived from a more diverse temporal span. The depiction of animals is relatively rare when compared to the plaquettes, though still represents a significant theme. When animals are depicted in the

Figure 6.12.

Figure 6.12. showing pal art no. 624, a naturalistic ibex in left profile, depicted on a fragment of long bone. Scale in centimetres. Image: author.

organic assemblage, such as in pieces no. 624 (fig 6.12.), no. 627 (fig 6.13.), and no. 628 (fig 6.14.), they can be highly accomplished. More typical are abstract geometric motifs, primarily composed of straight and curving lines. There is some 3D sculpture, mostly of

Figure 6.13.

Figure 6.13. showing pal art 627, a bison heads in right profile (left) facing a horse heads in left profile (right) made on a fragment of bird bone. Scale in centimetres. Image: author.

Figure 6.14.

Figure 6.14. showing pal art no. 628, depicting a naturalistic horse in left profile. Scale in centimetres. Image: author.

animals and in association with objects that possess a readily discernible 'practical' function, such as spear throwers. One class of animal depictions, engraved onto highly fragmented pieces of long bone, probably from a medium ungulate, is of interest as it demonstrates the close association between the material and the subsequent animal form depicted, mirroring that seen in plaquettes. These examples, four in total, have all been produced with the use of long bone fragments that are likely the end product of the marrow extraction process, and would typically constitute waste (Farbstein 2013). However, in this case these bone fragments appear to have been evocative and harnessed as a support in art production. Rather than simply being discarded as refuse, they were the source of inspiration for the animal forms that were engraved onto the support, with the shape of the broken bone fragment summoning up an animal that was then completed by the artist. The active role of the material in these cases can be clearly evidenced, with the usual naturalism employed in animal depictions in the organic art being relaxed to better accommodate the existing animal form already partially evident in the shape of the material itself (fig 6.15.; fig 6.16.; fig 6.17.; fig 6.18.). The thing depicted would appear to flow from the material in these cases, perhaps suggesting that the material was active in

Figure 6.15.

Figure 6.15. showing pal art no. 629, a depiction of the head of a horse in left profile made on a fragment of long bone. The bone was broken prior to engraving and seems to have acted as a point of inspiration for the subsequent horse head, with the latter incorporating elements of the form of the former. Scale in centimetres. Image: author.

Figure 6.16.

Figure 6.16. showing pal art no. 630, a depiction of the head and outstretched neck of a horse in left profile, made on a fragment of long bone. The bone was broken prior to engraving, in the was described for pal art no. 629 in figure 6.15. above. The engraved form similarly incorporates features of the support, in this case warping the depiction of the horse to better fit the evocative shape of the support. Scale in centimetres. Image: author.

Figure 6.17.

Figure 6.17. showing pal art no. 639, a depiction of the head of a fish in left profile on a broken piece of bones. The piece of bone was likely broken prior to engraving and the form of the bone has inspired the resultant fish depiction. Scale in centimetres. Image: author.

the formation of the art. This would seem to follow the same logic as the depiction of animals using limestone supports, suggesting a degree of overlap in at least some parts of the organic assemblage, in this case through the native shape of the support, which is incorporated into the final form depicted. A single, fragmented example of a contours découpé (fig 5.34.) has also been recovered from the site. The ramifications for mobility and inter-group connection posed by contours découpé was discussed in chapter 5. They

Figure 6.18.

Figure 6.18. showing pal art no. 637, a depiction of a bird in left profile on a broken piece of bone. The bones was broken before the depiction was engraved, with the broken top edge of the bone acting as the top of the beak, head, neck and wing, while the remainder of the bird has been engraved on the bone. Again, the evocative form of the broken bone has inspired the resultant animal depiction. Scale in centimetres. Image: author.

are of interest also for the complex relationship they reveal about animal/human relations. Conneller (2011, 34) has plotted a complex relationship with the use of horse hyoid bones to create contours découpé featuring horse head engravings. Here the shape of the hyoid bone naturally summons up the shape of the head of a horse. There is a clear interconnection between the animal from which the material is derived, the native shape of the material, and the thing depicted, all of which are horse. Palaeolithic humans seem to have played on this and carried through the form of the horse that was already there, very much in the same way as bone fragments and weathered limestone blocks at Montastruc already identified.

A further tentative parallel can be drawn between materials selected to create organic art and stone art, with connections between limestone and reindeer antler. Bétirac (1952) noted that the reindeer antler used in art production at Montastruc was sourced from the collection of naturally shed antler rather than derived from harvesting antler from kills. Bétirac (1952) identified reindeer as one animal amongst many that were actively hunted at Montastruc. This highlights the potential to harvest at least some, if not all, of the necessary antler as a by-product of meeting subsistence requirements through hunting. There is a possible functional benefit to utilising shed antler: it is harder and so of better quality than freshly grown antler that might be sourced earlier in the season from kills. However, this is balanced against the greater costs of specific seasonal collection, with the time and place of shed being somewhat unpredictable relative to antlers sourced from a kill. As discussed in chapter 4, the dropping of antler is seasonally circumscribed. Males shed their antlers at the end of the rut at the start of winter, while females retain their antlers throughout the winter, dropping them in the spring. To utilise shed antler, despite the presence of a near exact alternative, implies an awareness of and synchronicity with animal rhythms at Montastruc. It further implies a differential appreciation of closely related materials and their properties. Not all antlers were the same, just as not all stones were the same. In both cases, the natural 'shedding' of material, through the seasonal shed of antler by reindeer linked to breeding cycles, and the seasonal shed of stone by the rockshelter through freezing and thawing cycles, might have been a significant foregrounding to their collection and use in the production of art, rendering them appropriate for use in an artistic context.

There is some divergence in the life history of organic and stone art. The tendency in organic art is more typically that of a greater imposition by humans on the form of the material. This is evidenced especially in 'functional' objects. For example, this can be seen in decorated harpoons and barbed points, which are made by the removal of splinters of antlers from the beam, the shaping and smoothing of the splinter, and then the cutting and scraping away of antler to leave barbed projections. Such pieces typically act as a support for complex geometric engraving. The roots of the two materials, stone and antler, bring them together as materials that are closely associated to animals, and to seasonal rhythm. However, there is divergence in the subsequent stages of production in the life history. The overlap identified in some case of bone artefacts in which the form of the material has been incorporated into the engraving does evidence some direct overlap in bone and stone art after the material collection phase. These organic objects have no obvious 'function' as objects such as spear throwers or harpoons do, and this may be one of the root causes of the divergence.

6.6. Weaving the Strands: Interpreting Material Selection

Taken singly, these attributes of material selection provide only glimpses of some of the contributing variables to material selection, offering a deeper nuance to the understanding of selection. However, when woven together and explored through the animistic framework outlined in chapter 3, they converge to reveal elements of a cohesive and coherent cosmological system that shaped a different ontological field in which the relations between humans, animals and things were fluid and mutually constituting. The exploration of that theoretical framework does not preclude an exploration of aspects of science, such as the neurological or the cognitive (Jones 2004a). Here both neurology and theory derived from non-western ethnography is used to aid in the exploration of choices made in material selection and art production. There is no discord in the use of neurology and the use of theory derived from non-western ethnography. The two can complement one another and provide an important tool set to bring together these aspects of material selection.

The identification of recognisable forms within natural formations is a typical product of human neurology, which is attuned to the recognition of patterns and faces, a highly adaptive trait in a species living in a rich social setting (Kato and Mugitani 2015, 1; Liu *et al* 2015, 76). Within western academic discourse this phenomenon is termed *pareidolia*. This is an attribute that has attracted growing attention in Palaeolithic art studies (Bednarik 2016), as well as a call for active research in this area to further expand the neurological approach to art (Bednarik 2010, 80). Pareidolia is often associated with the recognition of faces in objects or natural features such as clouds, and is an extension of a neurological architecture evolved for facial recognition (Liu *et al* 2015, 61). Pareidolia is not limited to faces but can be associated with other non-face objects in which a person has experience and expertise (Liu *et al* 2014, 61).

Different types of pareidolia are processed in varied ways within the brain. As is typical with most brain processing, fMRI responses reveal the brain to be networked, with multiple dislocated brain regions associated with pareidolia, but that there exists specialised brain regions that are more active in face pareidolia vs. non-face pareidolia (Liu *et al* 2014). In face pareidolia, the right fusiform face area (FFA) seems to be highly attuned to recognising faces and is heavily implicated in face pareidolia, as well as the processing of real faces (Liu *et al* 2014, 76). Pareidolia seems to effect humans of a wide range of ages. Kato and Mugitani (2015, 7) found that face pareidolia was active in infants as young as 8-10 months, but not younger than 8 months, suggesting the necessary neurological development takes place only after 8 months. This further supports the association of pareidolia as an extension of core human processing skills in association with faces, and probably other objects in the environment. This would imply that the young are as prone to experience pareidolia as adults, a point which will be touched on again in relation to art and authorship in chapter 7. For Palaeolithic humans, who no doubt shared our neurological and cognitive capacities, this process also seems to have been active. What in a contemporary scientific setting is something of a novelty, in a Magdalenian setting served to reinforce a *pre-existing* ontological intertwining of humans, animals and things, acting as a ratchet to in turn shape the making and using of things.

Emphasis is given to this intertwining of animals, humans and things being pre-existing rather than contingent on the neurological architecture and experience of pareidolia. Liu *et al* (2014, 69, 75) note that the experience of pareidolia is not fixed, but rather have some variance between humans based on personal experience and expert knowledge. The recognition of forms other than faces seems to be associated with a locus in the left occipitotemporal cortex, termed the 'letter area' in this study. This area was linked to high activation during a parallel set of experiments in which participants were engaged in Roman letter pareidolia tasks rather than face pareidolia tasks, showing separate activations between the recognition of faces and non-faces related to expert knowledge. In a world where animals were essential, with much activity geared towards their tracking, hunting, killing and butchering, and the working of their remains into objects (see chapter 4), it is a fair summation that Magdalenian humans had an expert knowledge of animals (Hodgson 2003a, 104) and as a result they might feature prominently within their experiences of pareidolia, structuring the experience of seeing animals in the rock. The brain has specialised encoding domains for animals within the visual cortex, supporting a deep evolutionary intertwining of humans and animals, perhaps further supporting this view (Hodgson 2003b, 4; 2008, 345). It is the deep socio-cultural engagement and intertwining with animal rhythms that shapes mutable neurological architecture towards a specific output in this case, which in turn may act as a ratcheting influence, enhancing a cosmology in which animals reside in rock through the real, felt perception of animal forms in the rock.

Perhaps more significant is the relationships between humans, animals and things within the Magdalenian and how they were negotiated through art. It has become clear that this complex relationship was in part mediated through the art at Montastruc in the selection of materials. Materials were actively chosen from amongst a range of choices, with purely functional variables seemingly insufficient to fully explain such choices. The materials selected were shaped by non-human agency: the agency of reindeer to seasonally grow and dshed their antlers, and the agency of the rockshelter to similarly shed blocks through freeze/thaw. The materials produced, antlers and weathered limestone blocks, were not empty 'raw' materials, but rather were understood to be coursing with significance, carrying the essence of the reindeer and rockshelter of which they were a part, agentic fragments of the parent agent, still carrying the essence of the latter in the former. These materials might have been understood as gifts from non-human agents with whom humans had a protracted and complex relationship, relying on both for life, with the rock providing shelter and the reindeer providing sustenance. Montastruc was perhaps an important place for Magdalenian humans. Chapter 5 reviewed the site and the material culture record was suggestive of a locale subject to repeated occupation by a community engaged in the diverse activities typical of a living site. Montastruc was a likely significant place of shelter in a low lying valley and a natural draw for animals that might try to cross the river. These parts of the world, animals and things, were brought together through plaquettes, animal-rock. Animals could be found to reside in the rock, whether through fossils, or through the agency of the rock shelter, shedding blocks with suggestive, familiar animal forms, made visceral, felt and experienced through pareodolic perceptions of the material. The role of the human artist was perhaps to listen (Porr and Bell 2012, 198), to trace what was already there, to expand and to elaborate and repeat, but fundamentally to entwine the act of production with the material, responding to the properties and potentials of the weathered block. Through their form, materials *selected themselves* by virtue of conforming to an evocative animal shape that facilitated human mediation of the relationships between humans, animals and things through art creation and the manipulation of that form.

6.7. Summary

The selection of material is only the beginning of the life history of plaquette production but is nonetheless an essential stage to explore to be able to understand the actions that follow. The properties of the material, such as shape, were of central significance in material selection and had a formative influence on the animals that were engraved. This was not limited to limestone, with some evidence this pattern of listening to the shape of the material in creating art was also observed in some bone and antler objects. The differences between materials were thus brought into question, and the consideration of the cosmological significance of materials revealed them to be interwoven within a complex set of relationships and understanding of the world. It was suggested that animals, humans and things were deeply intertwined in complex, mutually shaping relationships (chapter 3). The case was made for this intertwining to be contextually rational and logical, experienced widely across the community, and within the field of art, strengthened by the experience of specific animal pareidolia, linked to a lifeway centred around engagements with animals. Pareidolia fed into a system of cosmological logic in which materials might have been categorised in novel ways, whether through colour or the sharing of attributes such as fossils that dissolved rigid category boundaries between different types of material culture, as defined by the contemporary specialist.

The following chapter (7) shifts focus to the next phase of the life history of engraved plaquette production: engraving and painting. In so doing, many of the themes explored in this chapter (6) remain active in this next phase, such as the manipulation of colour. New themes emerge, including a greater focus on the human within the human-material relationship, exploring authorship and skill, as well as exploring the relationships between broader sets of material culture through the use of stone tool and colourants.

Chapter 7. Engraved Stone Plaquettes: Engraving and Colouring

Chapter 7. Engraved Stone Plaquettes: Engraving and Colouring

7.1. Introduction

Chapter 6 explored the beginning of the engraved stone plaquette object biography, the sourcing and selection of materials. Chapter 7 builds on chapter 6 and explores the engraving of the support and the application of colour. The results of microscopy and 3D modeling are presented alongside a blind comparative analysis with Sieveking's (1987a) own analysis, to assess the forms depicted. This foundation is used to explore the engravings in greater detail. Several themes are explored, primarily stemming from the analysis of engraving and the application of pigments at different scales. Both engraving and the application of pigment necessarily involve the exploration of technology beyond the plaquettes that were used in their making. This highlights the interaction of different types of material culture in the production of plaquettes at the broader scale. Colour emerges as a significant theme that unites engraving and the application of pigment. A smaller scale analysis, focusing on the plaquettes and details of the engravings, highlights that the engraving of the plaquettes was executed with variable levels of skill. In turn, this brings into question who made the plaquettes, with a variance in skill implying a diversity of authorship. Despite this diversity, points of commonality suggest that the engraving of plaquettes was facilitated by learned strategies that created some points of conformity within a diversity of engraved forms. The specific character of the animals depicted is considered. The attributes of the animal depictions, while variable, can sometimes reflect a specific behaviour, sex, age or season. In the case of the latter, a potential mismatch between the season of animal depiction and the season of site occupation is taken as a point of departure to explore the depth of animal knowledge in Magdalenian artists and how the Magdalenian world was categorised, reflecting on aspects of their cosmology that was likely made manifest in the plaquettes.

7.2. Limitations in the Assessment of Engraving and Colouring

As was highlighted in chapter 3, the ambition of a contextual approach must be tempered against the realities imposed by the limits of a site with little contextual information and restrictions imposed on the study of the collection. These limits are felt more acutely when trying to reconstruct patterns of engraving and painting. The limitations are presented ahead of all results to temper the conclusions drawn.

7.2.1. Limitations: The Assessment of Engraving

Both the macroscopic recognition of engraving and its microscopic analysis rely on good preservation and visibility to be accurate, as well as a technique to visualise results, typically microphotographs. In analysing the plaquettes from Montastruc, limitations were encountered in both areas. The limestone surfaces are, microscopically, relatively poorly preserved. This is typical of soft stone supports, with the quality of preservation typically falling below that of engraved organics from the same site due to their propensity to erode (Tosello and Villaverde 2014). Microscopic analysis of several randomly selected organic artefacts confirmed Tosello and Villaverde's (2014) findings, with the organic surfaces preserving detailed and fine working traces not evident on the limestone supports. Correspondingly, the poor limestone preservation makes both macroscopic and microscopic observations more challenging, with the likelihood of error increasing as a result. It seems probable that finer engravings could have been all but obliterated through erosion or missed during excavation. This poses unquantifiable limits on plaquette recovery and subsequent form recognition and analysis. This does not render analysis impossible and has been mediated here through the use of 3D modeling and blind macroscopic and microscopic analysis, providing two points of comparison against existing observations published by Sieveking (1987a). These techniques are not exhaustive but collectively represent a significant development in the understanding of the assemblage and create a stable foundation upon which more detailed analysis is built.

A further complicating factor, which compounds those problems already outlined, is the application during the historic conservation of the collection of white ink within engravings of some of the plaquettes (fig 7.1.). This can obscure the interaction of intersecting grooves, or line order, critical to understanding their relationship. Yet greater caution is needed in assessing results of analysis from such surfaces. As digital methods become more affordable and integrated into museum displays, the prospects of cleaning and using a digital proxy to enhance the surface may make the cleaning of the plaquettes justifiable, effectively removing this consideration. This will result in a net benefit to the public, with higher quality, interactive proxies displayed alongside a restored original plaquette, as well as removing the barrier to analysis that the ink poses. In the short term, research efforts are limited by the presence of the ink, the removal of which potentially poses an unjustifiable risk to the object.

Figure 7.1.

Figure 7.1. showing plaquette no. 660, a bison engraved in right profile. The engraved lines are white as a result of the application white ink in the 19th century. This does serve to give an accurate sense of how the art would look when it was freshly engraved, but this can render contemporary research difficult, especially the analysis of the interaction of engraved lines to establish order of engraving. Scale in centimetres. Image: author.

7.2.2. Limitations: The Assessment of Colour

The research context, working within the British Museum student study room, restricted the range of techniques that could be used, especially in the assessment of colour. Health and Safety policy necessarily and justifiably limits techniques to those that pose no conceivable risk to museum employees. This included pXRF, a technique well suited to the chemical analysis of pigments, on the grounds that the beam of x-ray radiation emitted by the device can pose a minimal risk to humans. As a result, analysis of potential pigments adhering to plaquette surfaces was limited to macroscopic and microscopic observation. This reduces the degree of certainty in results when compared to the elemental spectra generated via pXRF, limiting results to observation rather than quantification. Deeper analysis, such as the recognition of chemical sameness or difference in paint mixtures, elucidating their composition, is also rendered impossible within these constraints. However, macroscopic and microscopic analysis is sufficient to generate meaningful observations sufficient to allow for some consideration of its place within the broader life history of engraved plaquette production.

These limitations do not prevent meaningful analysis of the plaquettes but rather control the extent to which quantification of observation can be achieved. This adds a necessarily speculative element to the insights derived from analysis. Nonetheless, those insights generated via close observation of the objects collectively reflect a deeper understanding of the engraving and painting process within the object biography of the plaquettes.

7.3. Comparing Old and New: Results of Blind Macroscopic Analysis

Sieveking (1987a) has published summary descriptions of each plaquette engraving from Montastruc, alongside supporting photographs and professional illustrations. This is currently the most comprehensive report of the engravings but it was not the first. Published accounts of the plaquette engravings, with supporting illustrations, feature in the *Stone Age Guide* (Smith 1902), as well as initial descriptions by Peccadeau de l'Isle (1868). These publications are of note for the degree of concordance between each different description and illustration of the engravings.

A new analysis of each plaquette was carried out at the macroscopic scale, using the naked eye, a hand lens, and macro photography, alongside a microscopic analysis using the complementary techniques of low-powered light microscopy and whitelight 3D modeling. This allowed for a blind macroscopic comparison against Sieveking's pre-existing results. It went further, using techniques at the microscopic scale not available during earlier phases of analysis to test if there were engravings that had been missed by the human researcher using macroscopic techniques. The full description of each plaquette can be found in appendix 1 and 11 (with supporting 3D still images in appendix 12). A summary comparison table (Appendix 8) compares these new results against those of Seiveking (1987a) to assess the degree of concordance between different researchers using varying techniques. High concordance achieved through blind analysis and comparison provides confidence of an accurate reading of the engraved surface, a key foundation for any further analysis.

As appendix 8 highlights, a total of 88 animals are depicted, with horse and bison the most common. These are mostly naturalistic and schematic depictions. The close match in results with previous analyses evidenced in appendix 8 suggests these forms are stable and reflect an accurate reading of the plaquette surfaces. The results offer a foundation upon which a deeper analysis can be overlaid, beginning with a consideration of technologies that are intertwined with the making of plaquettes. As expected given the consistency of previous publications, appendix 8 reveals a broad agreement between forms recognised in previously published research and those identified in the current research. The use of 3D models and a blind re-analysis served, on the whole, to confirm the presence of a suite of engravings already recognised and described (de l'Isle 1868; Sieveking 1987a; Smith 1902). Where there are differences, they pertain less to the discovery of new engravings that have been overlooked and more to the challenging of interpretations of what is depicted. Even this discrepancy is a rare occurrence and the new interpretation is by no means definitive, typically offering a viable alternative in a genuinely ambiguous case. This most frequently occurs as a result of breakage of the plaquette, resulting in the loss of key anatomical details. For example, plaquette no. 663 (fig 7.2.) depicts a wolf in left orientation and a horse, which overlies it in opposite orientation. The wolf is a rare form though not unheard of. This in itself is not a reason to doubt the interpretation of a wolf, but the lack of a head, lost due to a recent break, does add ambiguity. The narrow body profile is more consistent with a wolverine, an equally rare species in the animal art corpus. It is not possible to reach a definitive conclusion without recovery of the head, which in this case would hold the

Figure 7.2.

Figure 7.2. showing plaquette no. 663, a wolf/wolverine in left profile, with the heads lost to a recent excavation break (top left). The loss of this key anatomical feature renders the species identification ambiguous. Scales in centimetres. Image: author.

diagnostic species identifiers for this depiction.

The approach adopted in the re-analysis differed from that of Sieveking (1987a) primarily in the use of 3D models. The significant advantage in the use of 3D models is the capacity to understand the engraving in relation to the morphology of the support in great detail, in the same image, and without risk to the art due to the indiscriminate capture of the scan. This marks an important shift away from Sieveking's (1987a) illustrations, which detail the engravings somewhat at the expense of the support itself. A 3D model is not an interpretation in the same way as an illustration, and as such Sieveking's (1987a) illustrations remain the clearest abstraction of the plaquettes to inform on the macroscopic detail of the engraving. However, this clarity is at the expense of technical accuracy, with many of the details of the support typically omitted from the final image, which are designed to emphasise lines made by humans. The 3D models (appendix 7) provide a clearer sense of the interaction between aspects of the support and engraving, which it is increasingly clear were likely a shaping influence in how the art was produced (e.g. Bégouën and Clottes 1991; Hodgson 2008, 346-347; Pettitt *et al* 2014). Chapter 6 highlighted the significance of the limestone support. The rendering in sub-mm accuracy of the support, not just the engraving on that support, marks a significant advancement within an object biography approach where each choice and action is the subject of interest. The combination of a stable agreement of depicted forms, alongside a deeper understanding of the support through 3D models, creates a platform upon which further insights can be drawn. At one scale, this facilitates microscopic analysis of those engraved forms to assess their skill in production and how they were composed. At the broader scale it facilitates the exploration of interacting technologies, the tools used to engrave, the adding of colourants and the decisions made in composing the art. These areas are explored in turn, with consideration of the broader scale of interacting technologies and working, then shifting to the smaller scale of line-order analysis.

7.4. Working: Interacting Technologies

Engraving and painting requires the meeting of materials, the bringing together of the flint of stone tools, ochre or charcoal of paint mixtures, and the limestone of supports. A plaquette can be understood as a mingling of meaningful materials, modification through removal in the form of engraving, and modification through addition in the form of paint. An exploration of these supporting technologies can serve to further the understanding of that which they became a part through these modifications. Exploring a single life history can serve to highlight the intertwined nature of the Magdalenian world, in this case between stone tools, colourants and plaquettes. The extent to which the life histories of these supporting material cultures can be pursued prior to their intersection with plaquettes is here limited by the reduced archaeological context resulting from historical excavation. However, they can be plotted henceforth as the life histories of stone tools, colourants and limestone blocks intersect in the creations of a plaquette. While stone tools and colourants may at first seem distant and disparate technologies - and in other contexts they might well be - in the context of plaquette production they play discrete but overlapping and mutually supporting roles. As such, they are considered together.

7.4.1. Engraving

A significant component of plaquette object biography is to establish the type of tools used to create the engraved surfaces. A lack of spatial data from Montastruc limits the connections that can be made between specific stone tools and engraved plaquettes. The poor microscopic preservation limits the prospect of identifying tool marks within grooves that might elucidate methods of working and the types of tools used. A complete and detailed analysis of the stone tool assemblage was beyond the scope of the current study, as was any attempt at use wear analysis, the results of which would be far from certain in a collection curated for 150 years without procedures to control for contamination or modern wear. However, the limited stone tool data collected, reviewed in chapter 5, can provide some coarse-grained insights that are informative about the probable tools that might have been used in the process of engraving plaquettes.

The stone tool analysis revealed several peaks in tool types. Both scrapers and burins were found in high quantity. It is probable that these tool types can be implicated in, but not limited to, the production of art. The robust point of a burin would be effective in engraving stone and other materials (Cook 2010, 31; Sieveking 1979, 51; Tosello and Villaverde 2014). These different tools are likely to leave distinct marks when used to engrave bone, antler or soft stone. The irregular, retouched edge of a scraper would leave a distinct profile relative to a burin or blade that would leave a single ‘v’ shaped groove. The engravings on the plaquettes from Montastruc resemble the latter, supporting the case for burins or blades being used. The picture is no doubt more complex; the typological category a stone tool occupies does not strictly predict its potential uses. Work by Alvarez *et al* (2001) highlights that even flakes can be used to create engravings. Within the confines of the limitations the site and research context imposed, this is a research question that might most readily be pursued with actualistic experimental replication of tool types to assess the specific working marks left on limestone, bone and antler, as well as tool attrition and retouching or replacement. Such a detailed experimental analysis is beyond the scope of the current research, though is a priority in future research.

Fresh engraved lines produced by stone tools would be a vibrant white in colour, a result of fine powder residue produced during engraving as both the stone tool and the limestone are eroded through abrasion during use. As such, the creation of negative groove profiles, the taking away of limestone, can be simultaneously understood as the adding of colour. This colour is distinct and linked to the specific method of human intervention. For example, while incising with a stone tool creates white grooves, natural breakage by contrast typically produces an angular edge, grey in colouration, consistent with the fresh surface of the limestone. This property of the limestone reveals itself only through particular types of human action and would serve to render the engravings highly distinct and visible, more so than their current state of preservation would imply. This theme of colour emerges again in the application of colourants to the surface of the plaquette, perhaps implying some conceptual overlap between engraving and the application of colour.

7.4.2. Application of Colourants and its Significance

The application of pigments to at least some limestone contributes to an emerging sense that the manipulation of colour was a significant theme throughout the life history of the plaquettes. Paint has a complex production sequence, the appreciation of which serves to enhance the understanding of the thing to which it is applied. The pigment, whether because of its colour or the place from which it is sourced, might carry with it significance, which in turn flows into the things to which it is applied and becomes a part. This is perhaps reflected in the common practice of using red ochre in burials during the Magdalenian, highlighted in chapter 4, which would imply significance was accorded to ochre as a material.

As already discussed, there is a significant challenge in trying to analyse pigment from Montastruc, due to limits imposed on the application of quantitative methods. There are yet further specific limitations in the assessment of pigments at Montastruc, which are briefly summarised, gravitating towards their historic handling and curation and lack of contextual control. The most prevalent colours used in Palaeolithic art are red and black, typically produced from red ochre and both charcoal and manganese dioxide respectively. There is possibly a preservation bias associated with this colour pallet, with ochre, charcoal and manganese being chemically stable and so the substances most likely to preserve (Bednarik 1994). A wide assortment of colours can be produced from fauna and flora and the colour palette of Prehistoric art was potentially a great deal more diverse (Walker 2015). Given that red and black colourants are the most likely pigments to be encountered, Bétirac's (1952) identification of the presence of 'red layers' and 'black layers' in the stratigraphy of Montastruc poses a barrier to the simplistic attribution of any red or black surface concretions as residual preserved traces of anthropogenic pigment. Such traces might simply be sediment concretions reflecting the background burial environment. As the location of the plaquettes was not recorded in the original excavation, it cannot be ruled out that the plaquettes were derived from these black or red layers. Given the early excavation date of these finds, aggressive washing of finds was likely. While this would serve to remove sediment and reveal engraving, this might well have come at the cost of pigment removal in some cases. A long history of curation, with evidence for a less than careful handling and mounting policy during the 19th century, reflected in high rates of recent breakage in the organic collection, might have disrupted the surfaces yet further. An additional complication, and explored further in chapter 8, is high rates of burning of plaquettes, a common practice at Montastruc. The burning of limestone can lead to colour change and organic fuel used in the fire will carbonise, leading to a product that can transfer to the plaquettes and be difficult to differentiation from pigment.

Under such a set of limitations, attempts to recognise the anthropogenic application of pigments to plaquettes from Montastruc might seem forlorn. However, macroscopically, the position of the potential colourant in relation to engraving may offer one way to assess whether the residue in question is intentional and anthropogenic or natural and incidental. Anthropogenic activity might be recognisable in cases where pigment has been used to colour the interior surface of an engraved outline, as was done, for example, at the site of Parpalló, Spain (Roldán *et al* 2013; fig 7.3.). Similarly, the reverse of this pattern, colouring the outer surface and leaving the interior surface free of pigment, creating an animal negative, might reveal much the same pattern of anthropogenic intentionality. Of significance in both cases for recognising anthropogenic activity is the selectivity in colourant placement. It can be anticipated that natural processes would not be discerning in relation to engraving in this way. The limiting factors combine to constrain the results of the analysis of colourants to the speculative and preliminary, until such time as dedicated techniques can be employed to discern the pattern of colourant use in greater detail. However, despite these limitations, some unambiguous traces of anthropogenic pigment application were identified in the Montastruc plaquettes collection following these observational criteria.

Figure 7.3.

Figure 7.3. showing an engraved plaquette depicting a horse in right profile from Parpalló, Spain. Of note is the spread of colourant that has been used in conjunction with engraving, which is limited to the area within the engraved lines. This may be a diagnostic indicator of anthropogenic action. Image after Roldán *et al* (2013, supplementary).

Plaquette no. 658 (fig 7.4.), depicting a male bison in right profile, shows traces of what is likely both red ochre and charcoal based pigments. The tail and flank have been smeared with red ochre that broadly respects the edges of the engraving. The morphology of the ochre is very much reminiscent of a finger and it would seem the pigment was directly applied. The use of brushes is known in

Figure 7.4.

Figure 7.4. showing plaquette no. 658, a bison in right profile. Of note is the spread of red ochre (top left) and possible black charcoal (centre), possible indicative of the application of pigment. Image: author.

the application of pigment to Palaeolithic art (e.g. Fritz and Tosello 2007) but equally the hands were used as a tool in art production, for example in the creation of finger flutings (Sharpe and Van Gelder 2006; Sharpe and Van Gelder 2009) and hand stencils (e.g. Morley 2007). Fritz and Tosello (2007) note it is possible to discern the direction in which paint was applied, with the greatest concentration being the point at which a loaded instrument first contacted the surface, with a gradual reduction in the quantity of paint with distance from the point of first contact. Applying this insight to the paint from plaquette no. 658, the heaviest concentration of pigment is around the tip of the tail and this gradually decreases towards the flank. This is the likely direction of ochre application, starting at the tail and spreading the paint towards the centre of the animal. Adjacent to this is a localised black smear that is likely charcoal. The plaquette shows no evidence of having been subject to heating and so its presence as a contaminant from combusted fuel is unlikely. While the potential for this to be a natural accumulation remains, the localised nature of the trace, its proximity to a more clearly anthropogenic pigment application, and its position within the edges of the piece might all indicate applied pigment. If so, plaquette no. 658 could constitute a polychromatic painted plaquette, though this must remain a speculative conclusion.

Figure 7.5.

Figure 7.5. showing a piece of sandstone from Montastruc potentially used to grind ochre. Note the colour difference between the 'front' (left) and 'back' (right) of the piece potentially caused by ochre residue. Image: author.

There is further supporting evidence for the intentional use of colourants at Montastruc, elucidating some of the earlier phases of the chaîne opératoire of pigment. A small, flat piece of sandstone of fine and uniform texture was found in amongst the miscellaneous section of the stone tool collection during analysis at the British Museum (Fig 7.5.). Like other pieces of sandstone, this is remarkable as the site sits in a region rich in limestone, suggesting the intentional transport of sandstone to the site. Sandstone was imported to

Montastruc for the potential applications to which it might be applied afforded by its specific properties, especially grain size and associated abrading or smoothing properties. This particular piece of sandstone displays a subtle difference in colour across its faces, with one face a deep brown and the other a deep brown with traces of red. This piece was likely used as a grinding stone to prepare ochre powder, though this interpretation must remain a cautious one until specific chemical analysis can be conducted. However, the presence of a possible colourant to one side but not the other would be difficult to explain through natural processes. Grinding produces a powder of a finer grain size than scraping and would be ideal for painting (Rifkin *et al* 2016). This also implies a flexible and elaborate course stone tool tradition at Montastruc, with the properties of different stones being used for differing tasks, further highlighting a deep interest at Montastruc in the properties of materials.

It seems likely that colour and its manipulation played a significant role within the life history of the plaquettes at Montastruc. The unmodified, weathered rock has the yellows and browns reminiscent of antlers, and when this outer skin is broken with stone tools, a vibrant white colour emerges, the colour of bone, drawn out only through human engagement with the block through engraving, not present in naturally broken limestone. The engraved lines would have been a vibrant white against the yellow/brown backdrop of the weathered limestone surface. At least in some cases, the colour was further manipulated through the application of black and red pigments, respecting the engraved forms by limiting the placement of the pigment. These colours are potentially variously significant dependent on context, being applied more broadly than plaquettes alone. In the plaquettes at Montastruc, they may in part be linked to fire. This theme will be carried through and explored further in chapter 8 where the high rates of burning and heating of plaquettes is discussed, which produces reds and blacks as part of a colour palette produced in the thermal modification of limestone.

7.5. Composition: Line Order Analysis

Switching to the small scale, the composition of engravings is the component of the art that typically receives greatest attention when interpreting plaquettes. This is also the case in parietal art, where the painted form is deemed to be centrally important in analysis and interpretation, as discussed in chapter 2. This has led to a bias in which greatest attention is given to the finished form and specifically how that finished form looks. The critique offered in chapters 2 and 3, a call to shift towards a *decentred* approach to art analysis and interpretation that incorporates attributes of the broader life history of the plaquettes, does not cause an opposition with this existing research focus. Understanding how an engraving was composed is still an essential component of the object biography of Palaeolithic art. However, it is understood to be only a component of the broader life history of the plaquette in the first instance rather than the central or sole focus. The analysis of engraved composition of the Montastruc plaquettes reveals a diverse range of artistic style and skill, a highly uniform method of composing specific animals, and a propensity to utilise superimposition and manipulation of already engraved forms to compose the next animal.

The analysis of engraving reveals a pattern of both variable and systematic elements in the production of animal forms. At Montastruc, the animal forms depicted are variable, with some forms drawn in a naturalistic style, while others are much more schematic and simplistic. However, even in the presence of this variability, there is an underlying unity found in the art, with the composing of ungulates being a highly systematic process, with the order in which engraved lines were drawn being very similar between depictions. This relationship of sameness and difference in the art is exemplified by a comparison of plaquette no. 664 and no. 667.

Plaquette no. 664 (fig. 7.6.) is a small, weathered limestone block, with the full space of the support filled by highly detailed, naturalistic depiction of an adult horse in right profile. The head and neck of the horse have been lost due to a recent break. To the reverse, several notches have been cut into the edge, resembling marks made in palart no. 708, a river worn pebble with engraving and a failed perforation. The engraved lines of the body outline are deep, flowing and continuous, indicating a high degree of competency. The scale and creation of a sense of depth with the depiction of scaled foreground and background limbs, as well as fine detail lines depicting hair, further support an interpretation of a highly skilled depiction. The order of engraving can only be reconstructed in part due to the loss of the head and neck. Engraving would appear to begin with the line of the back and chest, followed by the front legs, with foreground limbs preceding background, into the abdomen, followed by the back legs, again with the foreground limbs preceding the background, and with each leg drawn from the top where it connects to the body down into the hoof, and finally the rump and the tail.

Figure 7.6.

Figure 7.6. showing plaquette no. 664, a horse in right profile. The confident, continuous lines, realistic proportioning, creation of depth with the depiction of foreground and background limbs, the fine details such as fine hachuring of the flank and abdomen to suggest hair, and the realistic hooves necessitating the use of complex and tightly curving lines, all suggest the depiction was created by an artist who was highly skilled. Scale in centimetres. Image: author.

Plaquette no. 667 (fig. 7.7.) makes for an interesting point of contrast. The limestone block selected is larger, relatively well rounded and shows signs of having been heated, likely after engraving. An adult male horse is depicted in left profile and similarly fills the whole space of the support. The method of engraving shows a marked contrast to that of plaquette no. 664. The engraving is relatively deep and clear, but lines are non-continuous, creating a 'choppy' or feathered appearance, with numerous short, closely packed lines creating the sense of an outline. This is especially clear in the legs where numerous, short, small lines have been engraved from the top of the legs moving down towards the bottom of the legs. This shows less technical skill in comparison to plaquette no. 664. This lack of

Figure 7.7.

Figure 7.7. showing plaquette no. 667, a horse in left profile. Anatomical errors, such as two tails, a mismatching line of the chest and the abdomen, a misaligned line of the back, as well as a lack of hooves, and legs created with non-continuous 'choppy' lines, all suggest this depiction was created by an artist of low skill. Scale in cenitmetres. Image: author.

skill can be further evidenced through the presence of numerous anatomical inaccuracies and possible mistakes. For example, the line of the chest does not meet the line of the abdomen, giving the abdomen a distended and low hanging appearance when taking into account the line of the back. The line of the back is raised too high relative to the positioning of the head. This is likely exaggerated due to the head having been drawn in an over-the-shoulder posture, but the back should, anatomically speaking, still be lower to accommodate the anticipated rising up of the neck to meet the head. Close scrutiny reveals that two tails have been depicted rather than one, with the first engraved much too high on the rump, leading to its abandonment and repositioning further down the rump in a more anatomically accurate position. The legs are also indicative of low skill, with the lines of the legs terminating to leave an open stump, with no attempt to depict hooves. The hoof necessitates tight, curving lines that can be difficult to depict with accuracy. Instead, the lines of the legs have been extended towards the edge of the support, possibly to try and give the sense of the hooves running over the edge or using the edge as the base of the hoof. If this latter point is correct, the piece would show some conformity with the utilisation of the material to form part of the depiction. This feature is also present in the utilisation of the projection in the material to the upper left corner being used to depict the ear of the horse and the mane, with the head turned around to give an over-the-shoulder perspective. This head position is rare in the collection and seems to map closely to the shape, and the affordances it offered, of this specific limestone block.

While there is a marked contrast in the degree of skill evident in the engraving of plaquette no. 667 relative to no. 664, the order in which the lines have been engraved is highly standardised. The order in which the body regions were engraved in no. 664 is the same for no. 667, with the head and back being drawn first followed by front legs and abdomen, and with back legs, rump and tail being last. This finding accords with that of Fritz (1999) who found that this pattern of line order was present in animal depictions from numerous Magdalenian sites in southern France. This would imply that there might be an element of standardisation in how art was produced, though the quality of the resultant depiction is less easy to control and is much more variable. In many respects, this accords with stone tool production, where the methods of production are standardised, but the resultant quality of the tool produced can be variable, linked to the skill of the knapper, as was highlighted by Pigeot (1990) and has subsequently found support in ethnoarchaeological analysis of stone tool manufacture, use and maintenance (Weedman 2002; Weedman Arthur 2010, 234-236).

Compositions can be more complex than single depictions and they provide a significant insight into the carrying through of the manipulation of form identified in chapter 6, in which the form of the material to a varying degree shaped the form of the resultant engraving. In many examples where there are multiple animal depictions on the same plaquette, the animals that have been drawn are incorporated and used actively in the creation of the animal engravings that follow. For example, plaquette no. 662 depicts five ibex in three orientations (fig 7.8.). A large adult female ibex has been engraved in right profile and was the first animal to be depicted. This was likely followed by the two ibex in opposite orientation, one depicting a head and neck, the other a smaller but full depiction of a male, with head in over-the-shoulder position, sporting prominent horns. These three depictions are intertwined in complex ways. The back legs of the large female have been reused in the creation of the front legs of the male with horns. The reason for the over-the-shoulder positioning of the head is to facilitate the necessarily peculiar angle of the feet.

The front legs have been drawn within the pre-existing lines of the back legs of the large female. To maintain anatomical conformity while integrating these lines, the animal was positioned in a half turned posture. The male with horns has in turn been incorporated into another engraving in a similar way, with the back legs and rump being used to give the front profile of the chest and neck of the depiction of the head and neck of an ibex, sitting below the large female. The two isolated ibex heads to the left corner, in a third orientation 90° to the large female, also follow this same pattern. The line of the neck of the uppermost animal fuses into the line of the back and the rump of the large female. The open mouth of this ibex is used in the next, the suggestive void left by the mouth being used to give the shape of the ear of the next, and the line of the chin being used along with the upper line of the horn, in what is a depiction of the head of a male ibex.

Figure 7.8.

Figure 7.8. showing plaquette no. 662, depicting 5 ibex. The ibex are each influenced by the position of the other ibex, typically with elements of the anatomy of pre-existing animals incorporated into the animals that were subsequently depicted. This mirrors the process of incorporating natural feature of the limestone morphology into animal depiction. Scale in centimetres. Image: author.

This pattern of utilising suggestive features and incorporating them into the next depiction, shaping their size, sex, posture and behaviour, is perhaps connected to the similar process of incorporating suggestive features of the limestone into animal depictions. In both cases it seems to be a strong structuring principle in how the art should be made, even at the expense of naturalism and easy recognition of animal forms. Instead, *how* they were formed was of much greater significance and was adhered to across the plaquette assemblage, both in terms of incorporating parts of already formed animals, whether natural in the material or cultural through completed engravings, but also the order in which body parts were depicted. The naturalistic animal form, the visual component, seems less important than how that animal form was realised. Conformity to the 'rules' of line ordering and drawing animals forth from existing forms in the rock or from forms created through placements of other animals was significant, to the point that the naturalism of the animal form was often compromised to achieve this. The resultant forms were a negotiation of the form of the rock, the form and positioning of other animal engravings, conformity to prescribed line ordering, and personal skill. Engraving stone plaquettes personify human-thing entanglements within a rich and active socio-cultural setting, where the locus of meaning seems to have rested more on *performance* rather than strictly how the engraved form looked once depicted.

7.5.1. Composition: Skill, Authorship, Learning

Two linked points emerge from the consideration of the engraving of plaquettes: skill and authorship. The method of engraving was highly standardised, with a similar order of lines employed regardless of species. This is despite the presence of a wide range of diversity in the quality of the final animal form, with some animals being highly schematised while others are detailed and naturalistic. Some depictions closely reflect animal behaviours and gestures through body position, and details that might indicate seasonality, age and sex, while others can only be recognised to species or grouping of closely related species. It would seem reasonable to propose that how the animal form was realised was as important, and perhaps more important, than the accuracy of the final form itself. This isn't to marginalise form and suggest it was without significance. Rather, there seems to have been broader considerations within the process of creation. This included the form of the rock and the affordances it provided for engraving animals, as well as conformity to engraving the animal in a specific way, reflected in systematised line ordering. The layering of colour thereafter was a further significant component linked to the engraving of animal outlines, colouring the inside or outside of the outline, perhaps in a complex interplay with the freshly engraved white lines.

These points intertwine during the creation of animal forms but also when trying to interpret the creation of engraved plaquettes. The artist behind the engraving, the human within the tangle of human, animal and thing relations playing out through the plaquettes, is of central significance in trying to interpret art and its role within Magdalenian society. Shamanic interpretations (chapter 2), for example, would set art apart from many in a Palaeolithic population, being the preserve of specialist shamans, possibly provisioned by other members of a society, creating concomitant changes in status, obligation and power between members of that community. However, the sameness and diversity within the animal art assemblage at Montastruc points to a different conclusion, further bringing the dominant shamanic argument, and associated ramifications of social organisation and hierarchical difference, into question. The presence of a diversity of skill, reflecting the work of a range of artists, would suggest a quite different interpretation: a wide range of artists rather than a single specialist likely enacted the engraving of plaquettes at Montastruc. The standardisation in line order of engraving might be interpreted to suggest a specific individual was responsible for the production of the art. However, the results of Fritz (1999) suggest this pattern was a common one to art created in the south of France, and potentially further afield. Instead, this specific order of laying down the lines was significant in two ways: it likely reflects the products of a system of learning, with the line order reflecting the socially proscribed way to depict an animal, perhaps passed on to the young and inexperienced through teaching. In serving this capacity, in being passed down in this specific way likely across generations, the specific approach potentially took on a deeper significance. How the animal was drawn could be a significant means of negotiating the relationship to the rock and the animal being depicted.

The variable quality of depiction can be linked in part to the morphing of animal shape to suit the natural morphology of the rock, as was discussed in chapter 6. However, this cannot account for all of the variance. It is probable that different artists were taking part in plaquette creation, perhaps with the more experienced creating highly detailed and accomplished plaquettes while teaching and guiding the inexperienced in the appropriate way to render animals visible with lines, the correct order of composition, and perhaps with less concern for the final form this process revealed. This type of art has been attributed to the work of apprentices, with the implication that experienced adults actively taught younger and inexperienced children (e.g. Bégouën and Clottes 1991). This is difficult to demonstrate but would be consistent with a pattern of diverse authorship and the presence of the employment of a uniform method but with variable output. This notion has received growing support and critical analysis in recent years (e.g. Fritz *et al* 2016; Rivero 2016). Guthrie (2005), modifying a list created for recognising the presence of child knapping activity, created a table of traits that might be observed in art created by children, redrawn in table 7.a. This does not provide a definitive indicator of the presence of child activity in association with art but does serve to formalise the method of assessment. The pattern observed in some of the plaquettes from Montastruc conforms to the expectations outlined in table 7.a., further supporting the interpretation that the young were involved in art production at Montastruc in some capacity, and that a shared strategy for depicting animals likely implies some degree of learning and sharing of knowledge between the experienced and the inexperienced. The limitations imposed by the lack of spatial data from Montastruc means a study akin to that of Pigeot (1990) and her analysis of skill in relation to space cannot be applied in this case; the interpretation must necessarily be more general and speculative as a result.

Table 7.a.

Traces of Novice Flint Knapping	**Parallel Traces of Novice Art Production**
Errors are often made in the initial visual conception. This misconception occurs before the first blow is made and results variously in inappropriate size, shape, proportion, and control.	Errors are often made in the initial visual conception. This results in difficulties in size, shape, proportion, and control.
Subsequent failures to conceptualize solutions to problems encountered once the work is under way become apparent in poorly conceived changes in knapping direction.	There is an inability to conceptualize solutions to visual problems encountered in the work or its design.
The goal may be practice rather than a finished piece, as indicated by leaving the finished piece at the knap site.	Images are often done on scraps or fragments of material and are clearly not intended as finished works. Often the images are discarded soon after execution. Thus, the goal seems not so much the production of a finished piece but practice.
Core preparation and maintenance are	Images often are made without proper

absent or rudimentary.	preparation of the surface, even superimposed or overlapping older drawings.
The core materials (and perhaps the knapping tools) are not of high quality or are inappropriate for the intended product.	Materials and techniques are often simple, with, for example, very little investment in complex paint preparation or preliminary sketches.
The artist often worked peripherally to the central camp and even in areas distant from traditional work sites.	Materials and techniques are often used that are not well suited to the substrate, theme, or size of the image.
Finished products deviate considerably from sizes and shapes normally produced by master knappers.	Drawings sometimes are done in unusual places, often well away from camp and even in places not only difficult to access but unlikely to be revisited.
Cores are often abandoned prematurely.	Final work deviates from forms used by more masterful drawers.
Tentativeness of blow intention show in hinge, rather than clean, feather fractures, while at the same time there are often strong bulbs of percussion showing excessive force.	Images are often abandoned prematurely, while very incompletely done.
	Tentativeness is apparent in overdrawing and changing of lines, and at the same time many novices' drawings have a crude and rudimentary aspect characteristic of a "heavy hand".

Table 7.a. showing a comparison of novice flintknapping activity used to formulate a parallel trait list for novice art production. Redrawn from the trait lists generated by Guthrie 2005, 137-139.

Insights from contemporary hunter-gatherer teaching and learning are insightful in shedding further light on these practices in the Palaeolithic, not least because models of teaching have typically derived from psychology utilising W.E.I.R.D. sample groups (Boyette 2016, 759-760). Teaching strategies and resultant approaches to tasks are different in hunter-gatherer societies when compared to sedentary populations with formal learning, such as schooling (Reyes-García *et al* 2016, 13). It is typical for teaching and learning in contemporary hunter-gatherers to be informal, variable in method and activity driven, often mediated by material culture and the close emulation of the tasks carried out by adults, with limited separation between child and adult worlds (Boyette 2016; Hewlett *et al* 2011; Hewlett and Roulette 2016; Reyes-García *et al* 2015). Teaching is often shaped by an egalitarian perspective that places importance on equality and autonomy, with learning being predominantly vertical at a young age from parents and closely related kin in close physical proximity, changing with age to incorporate peer groups and older, less-related group members (Hewlett *et al* 2011). Play is rarely entirely separate from the world of work and the former is usually wedded to the latter, providing a window into the adult world and a route to learning important skills for later life (Boyette 2016, 760). Critically, teaching can limit creativity. In learning a specific way to engage in an activity, other avenues of successfully completing a task are left unexplored, seeing a shift to increasing standardisation (Hewlett and Roulette 2016, 12). In this conception, teaching can be understood as 'structuring how to see'. Teaching shapes how a task is approached and carried out but also how it is understood and comes to be embedded within a cosmology and worldview. Learning the task is learning the world. In the case of plaquettes, their making and using was a routeway into building relationships with animals and materials within a relational cosmology where such entities could be animate and active. The making and using of plaquettes in turn fuelled these relationships and the perception of their animacy, ratcheting between felt experience through pareidolia (chapter 6) and cultural mechanisms of learning that reinforced cosmology and worldview through strategies of making.

The study of children and childhood has always been challenging in prehistory, not least perhaps because of a lack of interest by researchers (Baxter 2008; Shea 2006). However, the assumption that children were not involved in plaquette production is perhaps more suspect than the evidence supporting their active involvement, which has seen rapid growth in recent years. For example, hand stencils reveal that numerous people, with a range of hand sizes, were involved in its creation, as well as the young (Morley 2007; Snow 2006; 2013). The presence of footprints of a small child at Chauvet cave is not a definitive indicator of child engagement with art but certainly would suggest they were present in the cave (Bednarik 2008a, 177; Roveland 2000). There is strong evidence to suggest that some finger flutings, marks created in soft mud within caves by drawing the fingers through it, were also made by children, based on the size of the finger markings (Bednarik 2008a, 174-

175; Sharpe and van Gelder 2006; van Gelder and Sharpe 2009; van Gelder 2015). Bednarik (2008a, 176) has, for example, suggested that children were the likely authors of fingerprints evident on painted limestone blocks from the Magdalenian layers of Hohle Fels, based on their small size. Observations from stone tool analysis further support a capacity to recognise child activity. For example, experimental replication of stone tools under controlled conditions has confirmed that inexperience can be recognised through the objects made (Ferguson 2008), supporting archaeological observations that make the case for the presence of inexperienced knappers (e.g. Pigeot 1990; Grimm 2000). The attempt to interpret child action from indirect material culture traces is not without precedent, with the ethnographic observation that child objects are often made in miniature (e.g. Park 1998) supporting the exploration of the presence of miniature objects in the archaeological record (e.g. Spikins *et al* 2014; Stapert 2007). The association between children and art production is becoming increasingly well established. The involvement of children in the creation of plaquettes would be consistent with the broader observation that children played a role in other domains of art production and that their efforts can be recognised in at least some cases.

7.5.2. Composition: Animals Out of Time

The finished form of the animal may not have been of central significance in the making and using of the plaquettes, instead how they were made, both in terms of the incorporation of features of the morphology of the material, and composing the animal in the correct way, with the lines making up the outline engraved in the correct order, seems to have been more important. While much of the art exhibits low levels of skill, possibly linked to the uptake of art by the young or inexperienced, other pieces demonstrate high proficiency and skill. In some cases, a sense of the season in which an animal has been depicted can perhaps be discerned. For example, plaquette no. 664 (fig. 7.6.), discussed above, reflects high skill in a detailed and naturalistic depiction. The coat of the horse has been depicted as thick and full, with a series of fine, intercutting lines engraved across the flank and abdomen used to depict a full coat. Horses change their coat seasonally, with a finer, thinner coat in the spring and summer, and a thicker coat growing in the autumn in preparation for winter (chapter 4). A winter coat indicates an animal in peak condition after a summer of grazing. Most ungulate species follow a similar shedding and growing cycle in response to the changing seasons and this attribute can potentially indicate the season in which an animal is depicted.

The consideration of the specific attributes of animals is challenging but has the potential to provide significant insights into the meaning(s) of the animals depicted. For example, where the level of detail in a depiction allows for an assessment of the season in which the animal has been depicted, with the state of the fur or hair the typical indicator of spring/summer or autumn/winter depiction, a pattern emerges at Montastruc. Following Cook (2010), occupation at Montastruc likely occurred during the summer. There would seem to be a seasonal mismatch between animals depicted in the plaquettes, which typically show anatomical attributes consistent with autumn/winter, and the season humans occupied Montastruc, most likely in summer. Caution is encouraged with this possible association. The lack of site context does limit the interpretation of seasonality only to the most general and crude rendering, compounded by a lack of detailed faunal analysis that might support or falsify this interpretation of seasonality. The decontextualised nature of the assemblage acts to homogenise the entire site, blanketing nuance and variance with a single interpretation. As a result, the analysis of small-scale variance in seasonality through time is a challenging area to consider. Further, this interpretation rests on the presumption of some literalism in the animal art depicted, that the interpretation of fine details of art is meaningful, rather than a simple preference by the artist or artistic flourish. With these points of caution in mind, this speculative conclusion is potentially of significance in trying to interpret the plaquettes and acts as a point of departure for the consideration of the species depicted and their specific character at Montastruc. This discontinuity between the season of site occupation and of animal depiction would argue against any simplistic interpretation of 'engrave-what-you-see', perhaps most clearly expressed in hunting magic interpretations of the later 19th and early 20th centuries. As discussed in chapter 2, this line of argument was pervasive and popular into the early parts of the 20th century but fell out of favour thereafter with a growing appreciation of a mismatch between faunal and art assemblages on a site-by-site basis. This too is the case at Montastruc, with what little fauna reported by Bétirac (1952) being far more diverse than the animals depicted in the art. Not only were animals of a particular species significant at Montastruc but also animals in a particular condition, whether season and the associated anatomical change that came with it, or modes of behaviour, as reflected in body position and posture.

The species depicted in the plaquettes reflects the broader trend in Palaeolithic animal art to prioritise the depiction of horse. Horse is the most common depiction, with 39 examples. Reindeer were likely an important economic resource at the site, both as food but also as a source of materials, especially skins, antlers and fat. Reindeer depictions are typically rare and they are present but are few in number in the plaquette assemblage relative to horse, with seven examples. The presence of ibex and chamois, animals typically depicted only in upland sites, is relatively abundant, with seven and three examples respectively, though these largely reflect the superimposition or repeat of species on the same plaquette. Rare species also feature, possible including bear, wolf or wolverine, as well as a wading bird. The diversity in the corpus of art may to some extent reflect the drawing of animals in relation to evocative forms in the limestone blocks, but perhaps also reflects different types of relationships with a broad range of animals. It does not necessarily follow that the lack of depiction of an animal reflects a disregard for the species in question. For example, Brightman (2002, 32) reports that the Cree, hunters living in the boreal forests of Canada, rarely discuss bears in stories that detail their complex cosmological beliefs about animals and how they came to be in the world, despite the bear being held in high esteem and respected for its many human-like qualities. There is perhaps a parallel case in the Palaeolithic with dogs, where body parts such as teeth are held in high esteem and used as pendants (Shipman 2009, 288-289), dogs are given burials (Germonpré *et al* 2012) and often share the diet of humans (Germonpré *et al* 2009, 488), but are rarely depicted in art (Shipman 2009, 287). Instead, the point can only be made to a far more general level that the depiction of animals in specific seasons and behaviours might have held cosmological significance, in part shaped by the association of limestone and its native, suggestive shape.

The temporal mismatch between the likely season of occupation at Montastruc and the season of depiction might also be significant. The interpretation of a depiction as a horse or a bison may be valid, but perhaps too general and inclusive. These categories may be shaped by a contemporary western division of animals, primarily organised and categorised by species and biology. Chapters 3 and 4 highlighted that understandings of animals might have been different in the Magdalenian, linked far more to their specific behaviours in the world, with a deep understanding of animal behaviour and capacities linked to their successful hunting or entrapment. While each animal might contribute similar resources to the human world, whether bone or antler, meat or fat, skin or feathers, how these materials were acquired required a deep understanding of the specific patterns of behaviours of highly distinct animals. The detailing of seasonality, sex, behaviour and posture, solitary or in the presence others, might all be deeply meaningful in how the engravings and the plaquettes were understood. For example, horse depictions might be differentially categorised based on specific behaviours, postures, seasons, or anatomical changes. As such, a horse depiction might be as different from another horse depiction as it is from, for example, a bison depiction, depending on the sameness and difference of these attributes. Equally, a horse and bison depiction, by virtue of sharing many of these attributes, might have much more binding them together than two different horse or bison depictions. Clearly this avenue of research requires considerable further critical attention and detailed analysis to explore specific relationships contextually and to explore new, nuanced means of categorisation. Within the context of the plaquettes from Montastruc and their biography, it is enough to appreciate that the category division by species was not inevitable and while it may be significant in interpretation, it may mask a great degree of nuance and diversity within the assemblage that more closely accord with the nuanced Magdalenian understanding of animals.

7.6. Comparison with Organic Art

The interpretation of the engraving and painting of plaquettes can be further complemented by a comparison with the organic record at the same stage of the respective life history. A comparison provides vital context to those choices identified in the creation of the plaquettes during engraving and painting. In keeping with chapter 6, the discussion of the engraving and painting of organic art is based on macroscopic observation and is discussed in brief summary, emphasising points of sameness and difference to the plaquettes rather than a detailed analysis.

A comparison of organic art and plaquettes reveals marked differences in the assemblages at this stage of their respective life histories. There is potential difference between the stone plaquettes and organic objects in regards to the use of colourants. All of the same limiting factors apply as for plaquettes to the organic collection, with potential evidence for colourants having been lost. However, evidence for colourants is less evident in the organic assemblage than even in the plaquette assemblage. Some objects do indicate possible ochre, for example no. 579 (fig. 7.9.). A difference in preservation seems unlikely as the material was recovered from the same site and potentially from the same level in some cases. Instead, it seems that the application of colour to organic objects at Montastruc, and its broader manipulation across phases of the life history, was less prominent in the organic art assemblage. Concomitantly, the active manipulation of colour is not apparent in the organic assemblage.

While there is variance in the range of skill evident in the organic assemblage, perhaps indicating that this was an area in which a wide array of artists were involved, it is not so clear and to such an extent as in the plaquette assemblage. A full analysis of line order in the organic assemblage would be needed to take the comparison further. This apparent difference in skill may in part result from abstract, geometric designs being technically less

Figure 7.9.

Figure 7.9. showing pal art no. 579, an engraved piece of antler with geometric designs. There is a possible case of ochre adhering to the surface (left) but this could easily be fine adhering sediment, which can appear in hues of deep reds and browns. This is more likely, given that the potential colourant is also evident adhering to an ancient break, suggesting that if it was a colourant it would have been applied after breakage. Scale in centimetres. Image: author.

complex to produce than detailed animal forms, ultimately being largely composed of interconnecting straight lines of varying lengths and angles, rather than lines which are trying to capture a particular animal form. Instead, there is perhaps greater skill evidenced in shaping the material, in some instances sculpting animals in the round, in others creating complex multi-component tools with elaborate designs. It has been suggested that there may be greater restriction in access to bone, antler and ivory in comparison to stone, perhaps suggesting a different field of social relations playing out through different material types and their properties, including rarity (Fritz *et al* 2016).

These trends differ somewhat from results of the earlier comparative analysis of the parallel biographies of stone and organic art in chapter 6 during material sourcing. It would suggest that while there are commonalities between organic and stone art assemblages, there are also points of divergence as the various life histories unfold, perhaps indicating a variance in use at different phases of the life history. The different nature of engraving, with animals prominent in the plaquettes and geometrics common in the organics, may further support a different role for the different types of art.

7.7. Summary

An analysis of engraving and colouring revealed some important points of connection with material sourcing. During material sourcing and selection, colour and its manipulation were important. Engraving produced animal forms but also manipulated colour, creating a vibrant white groove against a weathered limestone support. The application of pigment saw further explicit manipulation of colour, with various colours potentially being charged with different meanings and significances. These activities are entwined, with the placement of pigment respecting the animal outline produced during engraving, typically colouring the internal area demarcated by the engraving. No such manipulation of colour was evident in the organic assemblage by contrast, where the engraving would produce limited colour contrast and there was little to no evidence for the application of pigments.

It is apparent from an assessment of the order of lines composing engraved forms that a diverse array of artists made the plaquettes. This likely included adults and children, experienced and inexperienced, according well with a growing body of evidence from contemporary hunting and gathering societies that there is only a modest division between the spheres of children and adults (Boyette 2016, 760), as well as increasing direct evidence of the involvement of children in other types of Palaeolithic art production (Morley 2007; Van Gelder and Sharpe 2009; Sharpe and Van Gelder 2006; Roveland 2000; Snow 2006). This realisation brings into question the interpretation of art as the product of only a few, possibly shamanic, specialists. Instead, the cosmological mediation playing out through the creation of plaquettes was an activity of the many, with a large number of the community of different ages engaged in the negotiation of relations between humans, animals and things. This wide engagement suggests art was produced in a rich social setting in which learning and teaching could take place, as evidenced by a conformity to specific ways of drawing engraved lines in the correct order to depict animals, despite a wide diversity in the resultant quality of depiction. This negotiation of the material and the employment of the appropriate method of depiction in turn perhaps served to enculture the young into the proper treatment of animals, mediated through things, with the act of creating serving to forge and mediate these relations: learning the task was simultaneously learning the world.

The nuance and detail evident in some animal depictions may have reflected a complex relationship with animals in which they were understood through a deep knowledge of behaviour and capacities, as well as anatomical dynamism linked to seasonal flux. The capturing of these details might suggest a complex way of ordering the Magdalenian world of animals, reflected in the details captured in the animals depicted. These depictions were likely from memory, with animals in the world at the time of occupation not always resembling the behaviours and anatomical features depicted due to a seasonal mismatch, further evidencing this depth of animal knowledge.

The next chapter shifts focus to some elements of how plaquettes were used. In particular, the chapter considers the high rates of heating and burning evidenced on the plaquettes, again implicating the manipulation of colour and form.

Chapter 8. Engraved Stone Plaquettes: Heating

Chapter 8. Engraved Stone Plaquettes: Heating

8.1. Introduction

This chapter explores the final stages of the life history of the plaquettes from Montastruc, their heating and fragmentation. The evidence for heating of the plaquettes is widespread and the chapter considers if this was a practice restricted to plaquettes or common to other types of material. It also tries to understand if this pattern reflects an incidental or intentional and significant pattern, in part shaped by the distribution of heating traces in relation to material type. The ramifications of this pattern and how it contributes to understandings of the plaquettes is considered, highlighting the continuing theme of colour change in the plaquettes. Linked to the evidence for high rates of heating is an associated pattern of high rates of thermal fracture. The same questions of intentionality and scale are applied to this pattern as were applied to heating. The high rate of plaquette breakage is considered alongside a pattern of low rates of plaquette refitting, bringing into focus the plaquette fragment and its significance. It is argued that this mosaic of attributes, high rates of heating and fragmentation, low levels of refitting fragments, low rates of burning in the organic art assemblage, suggest that the heating and fragmenting of plaquettes was an intentional part of the life history of the plaquettes. A speculative interpretation of the potential significance of these patterns is outlined, drawing out themes that potentially connect with aspects of earlier phases of the plaquette life histories, especially the manipulation of shape and colour and its significance.

8.2. Assessing the Context of Heating: Limitations and Viable Scenarios

A lack of spatial context renders the consideration of the heating and fragmentation of plaquettes in relation to combustion features challenging, in much the same way as engraving and colourants in chapter 7. This is perhaps magnified yet further in the consideration of heating and fragmentation, with a lack of preserved spatial association between the plaquettes and combustion features making a discussion of the specific associations of plaquettes and fire difficult to plot. Observations and resultant interpretations are necessarily speculative as a result. This area of investigation is significantly more reliant on the association of art and combustion features that were poorly recorded and no longer exist, with early summary publications providing little insight into potential spatial associations. This makes observations derived from the plaquettes important when trying to detail aspects of this relationship. One route to investigate the relationship between plaquettes and fire is to outline feasible scenarios derived from the broader Magdalenian record (chapter 4), highlight any aspects that would generate a specific material trace, and compare these models against the specific material signature encountered at Montastruc. Some potential scenarios are reviewed below and used as a point of comparison against observations derived from the plaquettes from Montastruc. Being derived from different contexts, these models are unlikely to exactly replicate the conditions of the relationship between combustion features and plaquettes at Montastruc. As such, they can only serve as a point of inspiration and a foundation to a more nuanced interpretation of the specific relationship between combustion features and heating and fragmenting of plaquettes at Montastruc.

8.2.1. Scenario 1: Incidental Taphonomic Action

It is possible that the heating observed in the plaquette assemblage is incidental. Plaquettes might have been deposited as waste in the rock shelter and heated as a result of proximity to hearths made on top of this waste, resulting in the incidental heating of the plaquettes scattered underneath. In this scenario, the heating would be an unintentional and insignificant component of the life history of the plaquettes, occurring after their discard. Heating and fragmentation would be categorised as taphonomic, caused by unrelated anthropogenic action. While technically of interest, heating and fragmentation could be legitimately removed from the life history of the plaquettes from an interpretive perspective, lacking any intentional anthropogenic quality. This is a fairly common explanation for plaquette fragmentation and/or heating traces. Bégouën and Clottes (1991), for example, have made the case for such an interpretation of the patterns of heating observed in the plaquette collection from the nearby Magdalenian site of Grotte d’Enlène, France. Grotte d’Enlène is a cave site with evidence for occupation, alongside a large collection of 1,500 plaquettes, featuring naturalistic animal depiction, with signs of both heating and fragmentation.

8.2.2. Scenario 2: Heating Plaquettes as Functional Utility

In some instances, heated and decorated plaquettes have been found alongside heated and undecorated blocks. For example, at the Spanish cave site of Parpalló, thousands of burned pieces of limestone were recovered, only a fraction of which were decorated (Roldán *et al* 2013). This excavation had the advantage of being carried out recently and with contemporary excavation techniques. This resulted in the collection of heat-modified blocks without engraving, which might not be collected in historically excavated sites. The blocks seemed to have been used in a functional capacity, used to store heat and potentially in cooking (Roldán *et al* 2013). Quite whether the engraved plaquettes served the same function as undecorated blocks is perhaps less clear in this case. However, the possibility that the engraved plaquettes might have been a component part of a much larger, undecorated assemblage fulfilling a functional role. Concomitantly, this may have ramifications in how the engraved plaquettes are interpreted and understood. This is challenging to explore in the case of Montastruc. Without any detailed notes that outline the specific artefact collection strategies by Peccadeau de l'Isle and Bernard Bétirac, it is not possible to establish whether the absence of burned and undecorated blocks is genuine or reflects the selective retention of engraved pieces and the discard of undecorated blocks. The latter is perhaps more likely, given Bétirac's (1952) observation of burned, undecorated blocks in some of the upper layers of Montastruc.

A variant of this scenario more fully incorporates the plaquettes within this functional role. The properties of limestone make it effective in storing and radiating heat. It is possible that the plaquettes were intentionally added to a hearth to limit the flow of oxygen, acting to reduce the rate of burning and consumption of fuel. The stone could also act as a store for heat, providing a source of radiating heat for a protracted period, a significant development in a cold environment with limited wood for fuel. Particularly well-preserved hearths suggestive of this configuration have been recovered from the Swiss Magdalenian sites of Champréveyres and Monruz surrounding lake Neuchâtel (Leesch *et al* 2010; Leesch *et al* 2012; fig 4.15.). However, it is perhaps important to highlight that the limestone blocks used to this end entirely lacked engraving at these sites (Leesch *et al* 2010; Leesch *et al* 2012). A potential expectation of this scenario would be the presence of the heating of limestone blocks on a larger scale, potentially including undecorated blocks, much the same as the scenario based on findings from Parpalló. However, the configuration of the hearth might well be dissimilar, as might be the corresponding patterns of colour change, residue transfer and fragmentation. This scenario still might indicate that the blocks were considered as waste at this late stage in the life history, with the presence of art being secondary to the capacity to store and radiate heat. However, the breakage would be an active part of the life history rather than incidental and taphonomic.

8.2.3. Scenario 3: Intentional Heating and Fragmenting of Plaquettes

A final possibility is that the heating and resultant fragmentation of plaquettes was intentional, an active phase of the life history that was more than a strictly functional act. In the case of Montastruc, this might be linked to the harnessing of the properties of limestone - its capacity to break apart and fragment - revealing fossil inclusions in the process, and manipulating new colours with changing heat and proximity to the flames. Where contextual information is known for plaquette assemblages, Sieveking (1987b, 12-13) suggests that there is typically a spatial proximity to combustion features, such as hearths, indicating a non-trivial connection between the two. Fritz and Tosello (2011; fig 8.1.) outline one such example of a rare engraved block recovered from the Magdalenian site of Étiolles in the Paris basin that conforms to this pattern. At Étiolles, the engraved

Figure 8.1.

Figure 8.1. showing a hearth from the site of Étiolles, France, with a concealed engraved limestone block (white arrow) forming part of its built fabric. Image after Fritz and Tosello (2011, 28).

block was carefully placed within a hearth structure, with natural blocks of stone placed on top, entirely obscuring the engraved plaquette. The undecorated blocks seem to have acted in a functional capacity in relation to the hearth, enclosing it and containing the fire. By contrast, the single engraved plaquette was carefully concealed within the hearth structure by undecorated stones, perhaps suggesting a deeper significance in its placement. This does not rule out its functional role in association with the hearth. Rather, it may suggest a layering of significances. The engraving and the significance imbued into the plaquettes during previous phases of the life history remained active and primary even as the plaquette shifted into a different phase of the life history in its role as device for storing and radiating heat.

The material signatures between these models are significantly overlapping, adding to the challenge of discerning a distinct type of relationship in a new context. There are distinct aspects to the specific material signature of each, though these differences are subtle. It isn't clear from a brief consultation of sites if there are specific attributes of burning that would be limited only to particular usages and discernible from the material culture alone. The extent to which the particular material traces of these scenarios can be discerned in the Montastruc collection specifically is likely limited as a result. Much of the necessary spatial control to make a specific extrapolation possible limits the extent to which the Montastruc collection can be conclusively interpreted. While the spatial control for historically excavated objects cannot be recreated, a comparison with the organic art assemblage does provide some insights that allows for the assessment of these different hypotheses to an extent, allowing for the assessment of which of the scenarios is more likely.

The specific pattern of heating and fragmenting of plaquettes is articulated below and compared to the corresponding pattern in the organic art assemblage. The attributes of each and discrepancies between these patterns are explored within the context of an awareness of these differing models. The specific patterns identified are used as a means to speculatively explore the likely nature of heating and fragmentation at the site, in relation to combustion features. The exploration begins with the heating of plaquettes and the continuing theme of harnessing and changing colour.

8.3. Heating Plaquettes at Montastruc: Changes in Colour

The evidence for heating in the Montastruc plaquettes is abundant and typically manifests as colour change to the edges of blocks, grading from deep reds and pinks, through to purples and blacks, examples of which are provided in figure 8.2. Colour change as a result of heating is apparent in 27 plaquettes, or 50.94%. The source of these various colours is distinct. The black colouration is associated with the accretion of material onto the surface of the plaquette. This is likely combustion residue from the burning event. The most likely possibility is charcoal that has transferred unintentionally onto the surface of the plaquette due to its proximity to the burning event. These different traces of heating and burning

Figure 8.2.

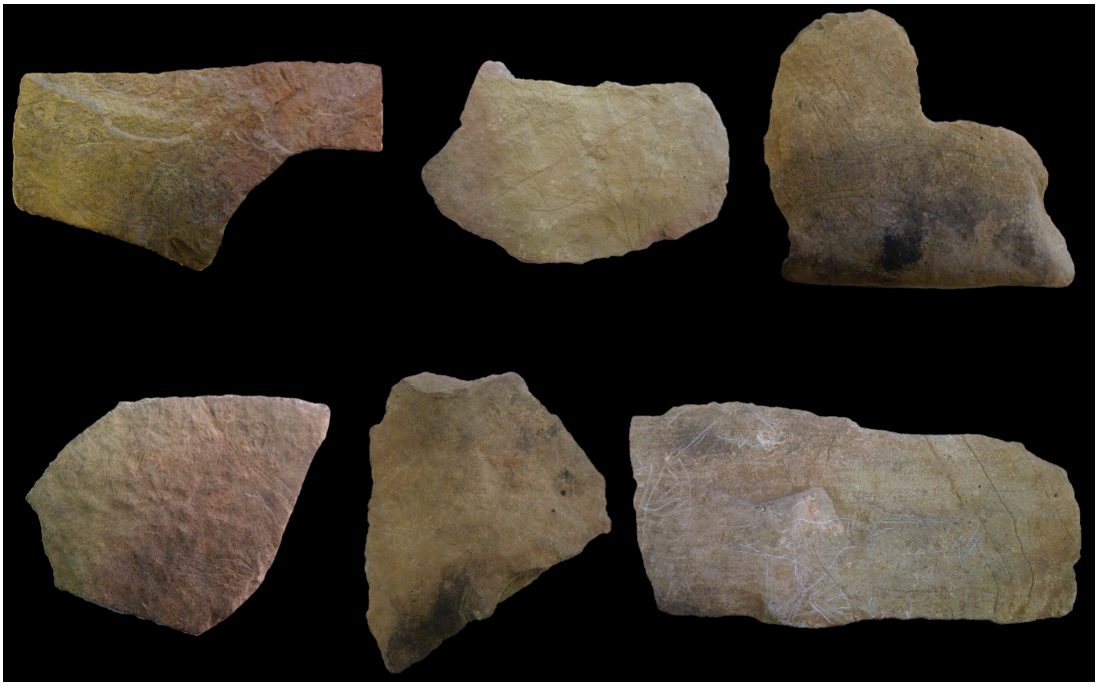

Figure 8.2. showing a selection of plaquettes from Montastruc with changes in colour as a result of heating. Plaquettes from top left moving clockwise: no. 698, no. 667, no.689, no. 695, no. 669, no. 674. Image: author.

would suggest that there was some measure of diversity in the burning conditions each plaquette was exposed to. The changes in colour are rarely present across the entire surface of the plaquette. This may indicate there was a thermal gradient across the limestone block, with some edges and faces in closer proximity to the heat source than others. The frequency of this pattern may suggest this type of burning is linked to a specific patterning in how plaquettes were positioned in relation to heating sources.

The relative order in which engraving and heating occurred can be discerned, with the heating of plaquettes almost always occurring after engraving. This can be clearly evidenced in plaquette no. 671 (fig. 8.3.), for example, which features a wading bird in right profile, depicted in naturalistic detail. The animal has two heads and necks that intertwine, suggesting there may actually be two animals stacked one behind the other, with the scene possibly depicting courtship behaviour. The plaquette shows a thermal fracture to the bottom of the plaquette, with the texture of the break being uneven and irregular, quite dissimilar from a natural break from force as seen on some edges. This fracture has resulted in the loss of the legs of the wading bird, suggesting that the engraving occurred before the breakage. This is further evidenced by the presence of pot lids, a product of thermal fracture that forces parts of the material to detach, leaving a distinctive cup mark

Figure 8.3.

Figure 8.3. showing plaquette no. 671 from Montastruc. The prominent void to the centre of the plaquette is a pot lid caused by thermal fracture. As the pot lid disrupts the engraving of the water bird, it is clear that engraving preceded thermal modification in this instance. Scale in centimetres. Image: author.

to the centre of the plaquette. The pot lids disrupt the detail of the wing of the wading bird, supporting the interpretation of thermal modification to the plaquette, as well as the order of action, with engraving occurring before thermal modification.

Some variation can be found in this pattern. Plaquette no. 669, by contrast, is unique in showing the reverse pattern of having been burned and then engraved. The plaquette has been engraved with a naturalistic horse head in left profile, of relatively low technical skill. The bottom of the plaquette has a clear, black discolouration and in some places the engraving runs through this darkened area. The grooves created by the engraving are themselves free of this dark residue, suggesting that the engraving occurred after the black residue adhered to the surface of the plaquette. It is probable that the plaquette was burned, resulting in the black deposit as a result of the transfer of burning residues, which was then subsequently engraved. This is a unique example in the plaquette assemblage, with each other instance indicating that heating or burning occurred after the engraving of the plaquette. It is also an important and rare example of the inclusion of non-engraved blocks of limestone being burned, a further significant point when trying to discern the nature of the burning event in relation to engraved plaquettes.

8.4. Heating Plaquettes at Montastruc: Fragmentation

Closely linked to the pattern of heating is the presence of fragmentation of the plaquettes, with an additional five, or 9.43%, showing some degree of breakage through thermal modification. In some cases, a plaquette displays traces of both colour change and fragmentation as a result of heating. Changes in colour and the eventual cracking and breaking of plaquettes all occupy different parts of the same spectrum of changes that can be anticipated with exposure to heat. There are many variables that shape what will happen to a piece of limestone when it is heated but cracking or fragmentation is more likely with longer exposure or higher temperature. Cracking, fragmentation and pot lids are evident in the plaquette collection, suggesting different plaquettes might have been exposed to different intensities of heat, burned for different lengths of time, or positioned in different ways relative to the heart source. It cannot be ruled out that plaquettes which evidence a greater intensity of burning could reflect the cumulative effect of exposure to numerous burning episodes. Some examples serve to highlight this variety, as well as providing insight into what these traces might indicate about the nature of the burning event and how plaquettes were used in relation to it.

Plaquette no. 685 (fig 8.4.), a rounded piece of limestone with two angular edges caused by ancient breaks, features a particularly complex series of engravings to the obverse surface. The engravings are of a stacked series of adult horses in various postures, some with necks stretched and bent low, others standing with head level. These horses, six in total, feature in two groups of three, the sets positioned at 180° relative to each other. This creates a sense of a mirror reflection between the two sets. The colouration of the plaquette is a dark brown, perhaps reflecting heating. However, the uniformity of the colour across the surface of the piece makes the designation less certain. Post-depositional staining or perhaps weathering could be alternate causes. The reverse of the plaquette reveals clearer traces of heating with deep and prominent cracking evident. The cracks are clearly visible even to the naked eye, but limited to the reverse of the plaquette. This may indicate that the reverse of the plaquette was facing the heat source, perhaps in direct contact, creating

Figure 8.4.

Figure 8.4. showing the reverse of plaquette no. 685. The surface shows signs of deep cracking and finer, ‘crazy-paving’, both indicative of thermal modification. White, deep markings to the centre top of the plaquette are historical tools marks deriving from excavations. Scale in centimetres. Image: author.

an appreciable mismatch in heating traces between the obverse and reverse surfaces. Such mismatches are common in the plaquette assemblage. It is rare for a plaquette to be completely changed in colour, with the edges typically much more heavily affected, or occasionally one side is affected, grading to an unaltered side. Nor does the entire surface typically show signs of cracking or fragmentation. Instead, different surfaces are differentially affected. Taken together, these patterns might suggest that the plaquettes were placed in specific ways in relation to a heat source with some sense of orientation, rather than fully enveloped. While speculative, this pattern might suggest that the plaquettes from Montastruc were positioned at the edge of a hearth, composing part of the built fabric of the hearth structure, with the variance in thermal modification reflecting the surfaces in closest and farthest proximity from the heart source, respectively. It is interesting to note in support of this suggestion that the previously discussed plaquette from Étiolles, positioned below unmodified stones as part of the hearth fabric, conforms to this pattern, with differential traces of burning across its surface (Fritz and Tosello 2011; fig 8.5.).

Figure 8.5.

[redacted]

Figure 8.5. showing an engraved plaquette recovered from Étiolles, France. The plaquette shows evidence of thermal modification across its surface, consistent with being in close proximity to a combustion feature, in this case a hearth. Image after Fritz and Tosello (2011, 29).

Plaquette no. 659 (fig 8.6.) is a clear case of thermal fragmentation. The plaquette is well rounded and deep brown in colour. The obverse surface is engraved with a bison in right profile, heavily weathered, rendering the depiction difficult to discern. The reverse of the plaquette indicates it is a small fragment of a larger plaquette, though there are no refitting elements in the Montastruc collection at the British Museum. The edges of the plaquette are thin and show no evidence of breakage by other means. Instead, the entire reverse surface has an uneven texture reflective of thermal fracture, indicating that the piece is a heat spall from a larger plaquette. Several casts of marine shells are evident and have likely acted as natural points along which the plaquette has spalled. If the observation above is correct and plaquettes were placed around a hearth rather than positioned within the hearth directly, the fragmentation observed may reflect the impact of thermal shock from multiple burning episodes, the multiple heating and cooling events resulting in the eventual spalling of the limestone block, or a block which was in close proximity to the heat source for a protracted period.

Figure 8.6.

Figure 8.6. showing the reverse of plaquette no. 659. The rough surface morphology with localised angular breaks is indicative of thermal fracture. The piece is likely a spall of a larger plaquette. Heat spalling has revealed several marine fossil casts preserved within the limestone matrix. Scale in centimetres. Image: author.

Breakage is typically construed as the death of a thing, the end of its life history. This may be true of the plaquettes from Montastruc to an extent. Where Tosello (2003) and Fritz and Tosello (2011) identify a pattern of the recycling and re-use of burned fragments of engraved plaquettes derived from patterns of plaquette usage in the north of France, no such recycling is evident at Montastruc in the south of France. At Montastruc, the plaquette was fragmented or burned and transitioned into a new state, either a different colour with an ambiguous surface, with engravings more difficult to recognise, or through fragmentation, which achieved much the same end. There is no evidence that the engraved and heated plaquettes were then subsequently re-used for engraving, with plaquette no.

669 a notable but unique exception. However, there is evidence that the life history of the fragments of a plaquette continued in some fashion after burning and the plaquette had been fragmented. If the plaquettes were simply deposited after they had been heated and burned, it should be the case that the fragments were found together in fairly close proximity. Post-depositional processes would no doubt move fragments from their original positions, but this would more likely be a process that would cause local disturbance rather than complete removal of relatively large pieces of limestone. Montastruc was subject to episodes of flooding, and so some movement of material should be anticipated. However, stone tools of less than 1cm in size have been recovered from the site, for example, suggesting that flooding events were likely of relatively low energy, disturbing the site and mobilising material but not necessarily size sorting and stripping finds away from the site. It is of interest to note that not a single plaquette refit can be found within the collection at the British Museum. This invites the question, as raised by Gaydarska and Chapman (2007) in relation to Neolithic fragmented figurines, "where are all the fragments?"

The lack of fragments could feasibly be the result of the incomplete excavation of Montastruc, with re-fits present at the site but as yet unexcavated. However, the absence of fortuitous refits, to be expected when only local movement of material can be anticipated through taphonomic action, renders this possibility improbable. The impact of multiple phases of excavation, with the resultant collections being stored in different museums, might further contribute to the problem of refit recognition, with fragments from the same plaquette potentially residing in different places as a result of the arbitrary division of different excavation areas carried out by different excavation teams. As there is no published catalogue of the Bétirac collection, this possibility cannot be assessed, but remains a testable hypothesis if ever the Bétirac collection is subject to more detailed study. It is again perhaps improbable due to the limited anticipated transport of material through taphonomic action. A possible alternative is that fragmentation was intentional, as were the resultant fragments, reflecting a desired outcome (Bahn 2014, 4). It is possible that the life history of the plaquettes did continue, in accordance with models outlined by Fritz and Tosello (2011) and Fritz (2003), but that the fragments were transported away from the site, to begin the next phase in their life history, spatially dislocated from refitting fragments left behind at Montastruc.

The case for intentional fragmentation is growing stronger and has been taken up on sites with controlled and large-scale excavation. The Magdalenian site of Foz do Medal Terrace, Portugal, is a good example. Foz do Medal is a minimally disturbed and secondarily deposited site consisting of 125,000 lithics and 1,504 plaquette fragments (de Figueiredo *et al* 2014; de Figueiredo *et al* 2016; Figueiredo *et al* 2014). The plaquettes are made from schist and greywacke and depict a range of abstract forms and signs, as well as schematic and naturalistic animals, recovered using a tightly controlled excavation and screening methodology (de Figueiredo *et al* 2014; de Figueiredo *et al* 2016; Figueiredo *et al* 2014). A high rate of breakage of plaquettes was reported, with success in refitting some examples. In some cases, direct refitting was possible, while in others only indirect refits of clusters of pieces was possible, with fragments still missing (fig 8.7.). Of interest was the discovery that at least some of this fragmentation was intentional, with heat implicated in some

Figure 8.7.

[redacted]

Figure 8.7. showing a refitted plaquette sequence from Foz do Medal, Portugal. In this instance, refitting fragments connect directly, though in many cases refitting groups cannot be directly connected to do the absence of fragments. Fragments are also missing from this example, despite a high resolution collection strategy. Image after Figueireo *et al* (2014, 435).

cases, and the re-using of some of the fragments produced, evidenced via their polishing and reshaping before subsequent re-engraving (de Figueiredo *et al* 2014, 431, 434; de Figueiredo *et al* 2016, 16). Clearly at Foz do Medal Terrace, fragments were important and active, a step in a broader life history. It is also clear through the presence of indirect refits that some fragments are missing. While modest disturbance and secondary deposition compounded by the partial nature of excavation may account for some such cases, it seems unlikely to account for all examples in so large an assemblage and with excavation protocols designed to maximise the recovery of plaquette fragments. Fragmentation seems to be a more dynamic and active process than previously appreciated, with Magdalenian artists actively harnessing this attribute of the material in some cases.

8.5. Assessing the Intentionality of Heating: Comparisons with Organic Art

Assessing whether patterns of heating, and associated physical transformations, was an intentional part of the life history of the plaquettes or incidental is challenging. This is only compounded by the limits imposed by the nature of 19th and 20th century excavations at Montastruc, which provide little in the way of spatial context of artefacts and features at the site. However, the insights generated from the assessment of colour change and fragmentation is significant in attempts to rebuild the specific pattern of heating, as well as how the plaquettes might have interacted with the heat source, at Montastruc. The intentionality of this interaction can be assessed to some extent via a comparison with organic art from the site to assess whether there are parallel or divergent treatments of the engraved plaquettes and organic art at this stage of the life history. This comparison creates points of contrast that allows for some recontextualisation of the patterns observed in the plaquette assemblage, especially in discerning whether they reflect incidental or intentional practices.

The pattern of colour change, cracking, and fragmentation in the plaquette assemblage, all evidence of exposure to heat, is distinct. Within the entire organic art corpus, there are no clear signs of heating or burning, and this trend also extends into the organic assemblage more broadly. Caution is needed in this comparison, as traces of heating can be difficult to detect in bone. The characteristics of burning in organics can be identified both macroscopically and microscopically, with changes in weight, colour and texture being typical, and with the loss of water and collagen and the expansion of hydroxyapatite with increasing heat expected (Hiller *et al* 2003, 5093; Solari *et al* 2015; Thompson 2004). Specific treatment of bone, for example burning versus cooking in a fleshed state, will correspondingly modify the expected pattern, with a smoothing of the bone surface in the latter and fissuring and cracking evident in the former (Solari *et al* 2015, 433-434). Increasing crystallisation of bone can be anticipated when exposed to temperatures below 1000°C, with changes being linked to both the length of the burning episode and the temperature reached (Hiler *et al* 2003, 5092-5093). Thompson (2004, S204) splits heating traces into primary and secondary categories. Primary traces might include the removal of the organic fraction, for example, while secondary traces includes attributes such as changes in colour. These indicators were not identified for any of the organic art or broader organic assemblage, including manufacturing waste.

This discrepancy between the pattern of plaquette heating and organic art heating could well be the product of anthropogenic action. However, it is worth noting several points of caution that must temper such a conclusion. Taphonomy might have caused the discrepancy rather than anthropogenic action. It is possible that thermally modified organic material was less likely to survive at the site, with the application of heat chemically modifying the organic material and making it more likely to degrade. It might equally reflect spatial patterning, the segregation of burned and unburned organic pieces, with the former yet to be recovered based on the placement of trenches. However, both of these possibilities are unlikely. For example, the presence of well-preserved microfauna in the organic assemblage would indicate a preservation environment conducive to organic preservation. It would seem unlikely that a context favourable to organic preservation would selectively destroy burned organics but leave small, vulnerable bones in good condition. Further, it might be anticipated that Bétirac (1952) might be sensitive to spatial patterning of burned and unburned material if they were encountered during his phases of excavation at Montastruc. Bétirac (1952) describes the spatial patterning of stone tools, for example, describing 'workshop' areas that were centres of lithic reduction, demonstrating an awareness of the significance of spatial patterning of material. However, there is no such description of any spatial patterning of burned and unburned pieces. The extent to which hearths and other combustion features are archaeologically recognisable might well be highly variable, compounding the spatial analysis of material. Canti and Linford (2000) suggest that a characteristic reddening of the sediment associated with heating might only occur if the ground temperature reaches 500°C, likely only in sediment types of low humic content or if specific industrial techniques are used to control the fire. Any interpretation of this pattern as resulting from anthropogenic action must be held as probable but speculative based on these factors.

While any conclusion remains a cautious and speculative one, this discrepancy in the heating of organic and stone art would seem, on balance, to most probably be the result of intentional anthropogenic action. The presence of microfauna and small stone tools would suggest Montastruc can be broadly categorised as a site with good preservation potential and which has only been minimally modified by flooding, likely leading to modest secondary deposition of artefacts within the immediate vicinity of initial deposition. Bétirac (1952) lends weight to this assessment, based on his published account of discernible activity zones, suggesting only modest disturbance. The signs of heating in engraved stone plaquettes are typically obvious and intense. They variously manifest as colour modification, pot lids, fragmentation through thermal fracture, and cracking. These traces typically occur after engraving and sometimes point to protracted and possibly multiple burning episodes. They typically occur preferentially to the edges or a single face, suggesting some degree of directionality and orientation in how plaquettes were positioned in relation to the heat source, rather than randomly distributed. In cases of fragmentation, not a single refit could be established in the collection. This is despite plaquettes breaking in such a way that multiple fragments would feature engraving, increasing the likelihood of their recovery. The pattern evident in the organic art collection makes for a sharp contrast. There are no clear traces of heating or burning in any of the organic art pieces and this extends into the broader organic assemblage. While ancient breakage is evident in some cases, this is more readily attributable to use, with many organic art objects having a functional role, such as projectile points and spear throwers used in hunting. These differences might lend weight to the view that the division reflects intentional choices within diverging life histories of different bodies of art that were being used in distinct ways at Montastruc.

8.6. Interpretation

Of the various possible models of limestone burning scenarios outlined above, the pattern revealed in the plaquettes through a comparison with the organic collection would most closely conform to scenario 3. Scenario 3 can be summarised as the intentional placement of plaquettes in close proximity to a hearth, likely forming a part of the ring of stones that contained the fire, alongside a number of undecorated piece of stone. It is probable that the burning of plaquettes reflects intentional deposition into hearth structures. The pattern is clearly distinct from that observed by Fritz and Tosello (2011), where only a single plaquette was found. Instead, it is the intentional placement and association with burning features that is informative through this comparison. The lack of undecorated burned limestone blocks is similarly informative, suggesting either that these pieces were not recovered, which is possible despite no significant discussion of their presence in published accounts, or more likely that the decorated pieces were used in higher concentrations in this regard than that identified in the north of France by Fritz and Tosello (2011), where plaquettes are typically a rare discovery. The minimal discussion of the burning of non-engraved limestone blocks on a larger scale by Bétirac (1952) might well indicate that this practice is largely absent from Montastruc rather than strictly reflecting a non-collection strategy during the earlier phases of excavation carried out by Peccadeau de l'Isle. However, plaquette no. 669 (fig 8.8.) would suggest that at least some blocks of limestone were being burned without first having been engraved. When taken together with the lack of burning in the organic collection, this could support a tentative case for the intentional burning and fragmentation of the plaquettes. The example of Foz do Modal, a high-resolution site with careful excavation where plaquette fragments were found to be missing, interpreted as reflecting an intentional anthropogenic signature (de Figueiredo *et al* 2014; de Figueiredo *et al* 2016; Figueiredo *et al* 2014), closely conforms with the pattern identified at Montastruc, where plaquette fragments are also missing.

Figure 8.8.

Figure 8.8. showing plaquette no. 669 from Montastruc. The plaquette is unique in that it was probably burned prior to engraving. This is evidenced by engraved lines that cut an area of discolouration derived from burning (centre-bottom of image). Scale in centimetres. Image: author.

The limitations in the assessment of heating and fragmentation of the plaquettes make the interpretation of these patterns necessarily speculative. However, there is sufficient evidence, based on observations drawn from the pattern of heating plaquettes as revealed through changes in colour and fragmentation, as well as in comparison with the organic assemblage, to bring into clearer focus the significance of heating and fragmenting of engraved plaquettes. Working from the assumption that the interpretation outlined above is broadly correct, some possible ramifications of the heating and fragmentation are considered within the context of the plaquette object biography, infused with a relational and animistic ontological perspective.

8.6.1. Manipulating colour and Form: Destruction as Construction?

The ramification of the intentional heating of plaquettes suggests that the result - changes in colour and fragmentation - might also have been intentional. The theme of colour manipulation, explored in chapters 6 and 7, has been shown to be present and active throughout the life history of the plaquettes. This may add weight to the suggestion that it was a property of the limestone that was actively harnessed and manipulated through the heating of the plaquettes. Where engraving served to reveal a new colour, white, that made the engraved form more prominent, the act of burning released additional colours, reds, purples and blacks, serving to re-ambiguate the surface, to blend the engraving back into the limestone support and render it obscure. These colours would only emerge through human action, engraving and the application of heat through contact with fire respectively, revealing hidden, perhaps desirable properties of the material. Fire might have been understood as a transformative medium, the flames making the engraved forms move as if alive, the white of the engraved lines working in concert with the morphology of the limestone, fused together into a vibrant animal form by the constantly shifting light of the fire. With time, what was rendered visible and vibrant was rendered obscure, with intense colours emerging with continued exposure to the heat of the fire, blending the animal form back into the rock from whence it came. The visible nature of the art does not seem to have been a permanent and fixed property but rather momentary and mutable, manipulated through fire to first become vibrant and alive and subsequently receding and becoming obscure. Being there, in the moment, to witness this modification was likely significant. The burning of plaquettes may have taken on an aspect of performance, with the witnessing of this transformation perhaps as significant as the making of the plaquettes. As was discussed in chapter 7 in relation to the engraving of plaquettes, performance emerges as an important theme within the life history of the plaquettes, with their full visual potency being a momentary coming together of the form of the limestone, the vibrancy of the fresh, white engravings, and the dancing flames of the fire. Understanding might only have been possible in the witnessing of this modification, with the meaning linked to the context of making and burning around the fire. As discussed in chapter 4, the hearth was central in the Magdalenian, a focus for activity, a provider of warmth, critical in the preparation of food, and a locus of social relationships (Wiessner 2014). The hearth was a social space around which humans socialised and interacted, came together, and renewed social bonds. Based on the high quantity and intensity of burning in the plaquettes, it might also have been a place in which relationships with animals and things were mediated. The cosmological intertwining of human, animal, and thing was made manifest in the making, using and depositing of plaquettes, the fire acting as a transformative technology in this process. The hearth was a locus of plaquette activity, as well as social activity, facilitating the sharing of skills and knowledge in the engraving of appropriate, evocative blocks. It is quite possible that the engraving was performed by firelight, the process of engraving affixing to the block forms that became visible through the play of a moving light source across the surface of the rock. The material in context, as seen by the light of the fire, guided the human senses through the experience of pareidolia informed by a deep knowledge of animals, to create naturalistic animal forms that emerged from the rock itself.

The fragmenting of plaquettes and changes in colour were perhaps harnessed to achieve much the same effect. They served to render once highly visible and recognisable animal forms ambiguous and difficult to identify. While this can be understood as a destructive act, with the form that inspired the engravings lost, it might also have been understood as constructive; the novel shapes produced through fragmentation afforded new potential to identify and draw different forms. With each fragment came the possibility of new evocative forms presenting themselves, inviting the renewal of the cycle of engraving forms that sprang forth from the morphology of the stone. In fragmenting the limestone, new properties of the material were revealed which presented new opportunities not seen with changes in colour alone. For example, plaquette no. 659 (fig 8.6.) highlighted that fossils not visible on the surface of the plaquette might be revealed during fragmentation, reinforcing the perspective that animal forms were closely linked to limestone and resided within it. In this sense, the fire acted as an agent in transitioning the plaquettes from one form into another, facilitating their deposition or their renewal and continued life history. However, extending of the life history through re-engraving fragments occurred only rarely at Montastruc directly. Only plaquette no. 669 was burned first and then engraved and even here this piece was engraved on only a single occasion. The lack of refitting fragments of engraved plaquette at Montastruc directly leaves open the intriguing possibility that further stages of the life history of the plaquettes, or rather fragments thereof, played out beyond the confines of the site itself. This is a yet more speculative suggestion, but there is reason to consider it as a possibility.

The outstanding question in the case of fragmentation at Montastruc centres on why there is a lack of refitting fragments at Montastruc. Given the current state of knowledge of the Bétirac collection, with no complete synthesis of the collection available, it is not possible to definitively rule out the presence of refits within the site. This is compounded by a lack of spatial context at the site, further limiting any investigation into the specific relationship between sets of material culture and their organisation. Neither can it be ruled out that small fragments might have been missed, or fragments of plaquettes that did not possess any engraving might not have been collected, instead mistaken for a natural limestone fragment. However, given the lack of clear refits from published work by Bétirac (1952) and from within the Peccadeau de l'Isle collection itself, even lacking the occasional fortuitous example that might be anticipated in what are relatively large collections, likely suggests that not all fragments of plaquettes remained on the site and at least some of them might have been transported to alternative locales. It is possible at least some of this transport was natural given that the site has been subject to periods of flooding, but the presence of a whole host of fine tools might indicate that flooding was gentle, resulting in only local disturbance. Instead, the movement of plaquette fragments might have been anthropogenic and intentional. The plaquette fragments, more readily transportable than the plaquettes themselves, might well have been curated for some period of time and moved to a different place. The fragmentation of the plaquette might have been the beginning of a larger, interconnected series of life histories of the fragments themselves, carrying on the life history of the original plaquette, growing with each new phase of a novel life history.

Fragmentation considered in this light might have been understood as a constructive act. As much as the fire destroyed plaquettes it created fragments, each charged with the significances imbued in the original plaquette, evidenced through the physical traces of those earlier life history phases, including parts of animal engravings. Fragments retained meaning and significance of this original life history, but in being transformed also offered new potential for the continuation of a new phase of the life history of the fragment directly, being potentially as evocative as the parent plaquette, inspiring new depictions in their own right. Fragmentation as an intentional and constructive act in art has found support in other archaeological contexts. For example, Chapman (2000), Chapman and Gaydarska (2007) and Gaydarska *et al* (2007) discuss this concept in relation to figurines in Neolithic and Bronze Age contexts. Chapman and Gaydarska (2009), Needham (2010), Soffer *et al* (1993), Vandiver *et al* (1989) and Vandiver *et al* (1990) have explored similar themes in relation to figurines in the Palaeolithic, arguing for a type of performance art where human and animal figurines were designed to fragment in contact with fire. An extended consideration of this latter example serves to highlight how fragmentation can be an intentional anthropogenic act within Palaeolithic art.

Dolní Věstonice, actually a cluster of sites dealt with as one complex, is located in the Pavlov hills of Moravia in what is now the Czech Republic (Absolon 1949b, 24; Vandiver *et al* 1990, 21). It was discovered in 1922 and excavated most notably between 1924 and 1938 by Absolon and between 1947 and 1952 by Klíma (Absolon 1949b, 24; Klíma 1954, 4; Vandiver *et al* 1990, 21). The site dates to around 31,915-31,446 cal BP (95.4% confidence) – 28,198-27,808 cal BP (95.4% confidence) and belongs to the Pavlov culture, a sub-type of the Gravettian culture (Klíma 1958, 8; Soffer *et al* 1993, 260; Vandiver *et al* 1989, 1002; Vandiver *et al* 1990, 16). The site has a diverse material assemblage including, though not limited to: human burials, structures and dwellings, stone tools, beads, pigments and dyes, a large mammoth bone midden and extensive hearths, kilns and burning zones (Absolon 1949b, 24; Alt *et al* 1997; Formicola *et al* 2001; Klíma 1954, 9).

Two kiln structures and several heavily used hearths were discovered surrounded by thousands of fragments of animal and human figurines (Soffer *et al* 1993, 269; Vandiver *et al* 1989, 1005; Vandiver *et al* 1990, 61). The ceramic inventory at the site numbers around 5,760 pieces and this number increases to around 10,000 if adjacent sites are also included (Soffer *et al* 1993, 262; Vandiver *et al* 1989, 1002; Vandiver *et al* 1990, 21). All of the fired materials would appear to have been fabricated from loess from around the site (Soffer *et al* 1990, 264; Vandiver *et al* 1989, 1003; Vandiver *et al* 1990, 35). The figurines were made in parts and assembled by pressing the different elements together (Klíma 1958, 9; Vandiver *et al* 1989, 1004; Vandiver *et al* 1990, 44). The colour of the fragments, largely greys and blacks, alongside experimental firing of modern samples, would suggest a firing range of around 500-700°C in a reducing environment for a short time and that they were likely cooled in ash directly after firing (Soffer *et al* 1993, 268; Vandiver *et al* 1989, 1005; Vandiver *et al* 1990, 30, 54).

Almost the entire assemblage, 99.99%, is made up of fragmented pieces and this pattern of high rates of breakage is intentional (Vandiver *et al* 1989, 1006; Vandiver *et al* 1990, 72). The fragments commonly display traces of thermal shock, indicating fragmentation within the kilns and hearths during the firing process (Soffer *et al* 1993, 268; Vandiver *et al* 1989, 1007; Vandiver *et al* 1990, 70). However, experimental studies have shown that loess is very difficult to thermally shock and survival during firing is easier to achieve than fragmentation (Soffer *et al* 1993, 268; Vandiver *et al* 1989, 1007; Vandiver *et al* 1990, 69). It would appear that thermal shock was induced via a pre-firing re-wetting process, causing the figurines to fragment during firing (Vandiver *et al* 1989, 1007). While the concept of intentional fragmentation seems alien, there is a growing awareness that this was a point of interest for Palaeolithic artists across multiple periods and regions. The pattern at Montastruc may suggest that plaquettes were yet another manifestation of this interest in the fragmentation of art and the manipulation and possible circulation of the fragments.

Bahn (2014, 4) has specifically raised the possibility of the intentionality of the fragmentation of plaquettes, lending support to this interpretation. Bahn (2014, 4) notes the difficulty in interpreting this pattern and that it could be caused by a number of sources, but considers intentional fragmentation in association with some aspect of performance a viable explanation. Of course, the meanings of fragmentation will not be static across space and time, but there is precedent for fragmentation being an active and constructive part of the life history, an agent of transformation rather than strictly one of simple destruction. This may have been the case in the final stages of the biography of plaquettes at Montastruc.

8.8. Summary

The interpretation of the plaquettes from Montastruc is limited both by the historical and research context, constraining the extent to which specific observations can be tested and quantified. However, the interpretation offered is a significant development both in terms of how to approach art but also in the nature of the interpretation. The interpretation will remain a tentative one until such time as the Peccadeau de l'Isle and Bernard Bétirac collections can be considered alongside one another. Equally, many of the challenges in establishing how the plaquettes were burned might be meaningfully explored further through the use of experimental archaeology. On balance, and tempered by the extensive limitations in exploring this specific phase of the life history, it is probable that the plaquettes were intentionally placed in proximity to a source of fire, likely some form of hearth, with the intention of modifying colour and perhaps fragmenting the plaquettes. The fire was likely actively harnessed for its capacity to bring out new colours in the plaquettes, in one moment to render the animals vivid and alive as light danced across their surfaces, in the next rendering them obscured as new colours began to hide the art that was moments before so clear. Fire might have been the constant companion of plaquette production, the locus around which humans engaged with one another socially, created plaquettes and harnessed the constantly shifting light to help see animals in the limestone blocks, the manipulation of the block in the light of the fire helping an animal form to spring forth in the mind of the artist. A lack of refitting fragments might suggest a divergence in the life history. For some plaquettes, this crescendo marked the end of the life history, while some fragments, perhaps based on a new evocative form released through fragmentation, became the focus of human attention anew, perhaps transported from the immediate vicinity of the hearth, if not from the site itself.

The discussion that follows in the next chapter considers the potential of the approach in light of its application to Montastruc. It is compared to alternate modes of interpretation that have typically adopted a more orthodox approach to the art itself, as outlined in chapter 2, and whether it carries any additional explanatory power or generates meaningfully distinct results that might suggest the approach has value. It further considers the extent to which the approach might be usefully applied beyond Montastruc to other art assemblages and perhaps beyond.

Chapter 9. Discussion: Assessing the Value of the Approach

Chapter 9. Discussion: Assessing the Value of the Approach

9.1. Introduction

The chapter summarises the main findings of chapters 6, 7 and 8, synthesising them into a summary of the object biography of the engraved plaquettes from Montastruc. This is used to reflect on aspects of Palaeolithic art more widely at two levels. The pattern identified at Montastruc is explored within a broader regional consideration of engraved plaquettes. This is done through a detailed exploration of Sieveking's (1987b) synthesis of plaquettes that was used as an aid in chapter 3 to formulate research questions of the Montastruc assemblage, acting here as an extended case study for comparison against the results from Montastruc. This reveals that the material modifications identified at Montastruc are not unique. Elements of a repeating pattern emerge that lend weight to the suggestion that there is scope for further application of an object biography perspective, infused with relational and animistic ontology, to other contexts to understand anew similar patterns of physical modification of objects. However, it is argued that meaningful synthesis can only be achieved by further application of the approach, not necessarily the simple transposing of the results of the approach onto other plaquette assemblages. This synthesis is also used at the yet broader scale to reflect back on monolithic interpretations of Palaeolithic art, discussed in chapter 2, for which the approach, detailed in chapter 3, was a response. It is argued that the approach adopted in this research challenges the orthodoxy present within traditional interpretations of art, and in so doing also facilitates the creation of new insights. In addition, the value of analysing collections excavated early in the history of Palaeolithic research that have been subject to protracted curation is considered. By challenging the starting assumptions of art analysis through *decentring*, it is suggested that an exploration of the full life history of the art from such collections allows for new insights to be realised. In turn, these insights are potentially highly relevant when trying to interpret the meaning of art from a particular site context, furthering such attempts. It is argued that this shift in approach is not only a useful alternate to the study of Palaeolithic art in general, but is perhaps especially significant in approaching archival collections where context is compromised and research focus must necessarily rest on the objects themselves. Given the potential scope for application to other collections of Palaeolithic art, it is suggested that the approach might well be usefully applied to other types of material culture in other contexts, as long as the approach is tailored to the specific contexts encountered prior to its application.

9.2. An Object Biography of Plaquettes from Montastruc

Chapters 6, 7 and 8 have been the culmination of an active attempt to *decentre* the approach to art, to focus attention equally on all elements of the life history of plaquettes, not just the finished piece of art and how it looks. The varied phases of the life history were traced through an object biography approach, informed by aspects of non-western ontology. This approach combined rigorous technique, empirical testing and observation, alongside a theoretical framework that embraced the intertwining of humans, animals, and things, inspired from ethnographic parallels as well as archaeological theory. This approach has allowed for the re-analysis and interpretation of the plaquettes at different phases of their life history in great detail. In turn, it is now possible to weave together the different phases of the life history into a cohesive, interpretive narrative of how plaquettes were made, used and deposited within the site context of Montastruc. The exploration of the sequential phases of the life history of the plaquettes, an object biography approach, allows the different elements of the approach, theoretical and technical, to work together in tandem to address small-scale, discrete questions about specific elements of the life history at each stage. The incorporation of broader evidence, both of the site itself (chapter 5), and of the Magdalenian more broadly (chapter 4), go some way to compensating for the significant limitations working with material largely without context poses, and provides the holistic detail that a contextual approach necessitates. To reconstruct context, plaquettes and art were conceived as a knot within a meshwork, with strands of interconnections with many other different kinds of material culture that contribute to their making, manipulation and the choices that flow through them. By unpicking the knot and understanding the role of each strand, it was possible to generate a greater level of insight at each stage of the life history of the plaquettes. It also allowed for a deeper reflection and appreciation of those strands that contribute to the plaquettes, enriching understanding of other aspects of the Magdalenian lifeway in turn. While much focus has rested on trying to tease these strands apart, what follows is an attempt to weave them back together, outlining each component of the life history as informed by the broader Magdalenian and site context in chapters 4 and 5, bringing together the major findings of the object biography of chapters 6, 7 and 8. As was stressed in the discussion of each chapter associated with each life history phase, elements of this synthesis are necessarily speculative until such time as further quantitative or experimental methods can be employed. The synthesis thus reflects a possible interpretation, not *the* interpretation.

Nonetheless, it is perhaps fair to suggest that the synthesis reflects a more nuanced understanding of the plaquettes from Montastruc.

The Montastruc plaquettes were a locus through which relationships with animals and things were mediated. Humans were introduced into this world and mediated it through building a network of relationships with non-human agents in part through the making and using of plaquettes. Blocks that were naturally detached from the rockshelter through freeze thaw were selected as the material for the making of plaquettes. These blocks were perhaps construed as a form of agentic gifting by the rockshelter itself, with humans drawn to their suggestive shape and colour, evoking animal forms and animal materials. The specific animals and their form were negotiated with the agentic limestone, with evocative features of the morphology of the rock incorporated into many of the engravings. Animals were a key part of Magdalenian life and were realised in the limestone through pareidolia, the seeing of animal forms in naturally evocative shapes in the rock, linked to the deep knowledge Magdalenian humans possessed about animals. Material selection was significant, deemed an act of gifting from a world rich in agency, even beyond the strictly human. This relationship was also evident in the selection of shed antler for making organic art and decorated tools. The weathered state of the blocks, with their evocative colouration of deep yellows and browns, made for a stark contrast to the colour revealed during engraving, which would leave markings of a vibrant white, rendering the engraved forms highly visible when fresh. The rock was closely linked to the animal, in the forms it evoked, in the inclusions in its matrix, such as marine shell casts, and in the close mirroring of the cycle of antler growth and shed in reindeer, with rock similarly weathered and shed through freeze thaw. The rock was liminal and agentic, active in its own selection by virtue of its shape, construed as touching the material and animal worlds as a result of its inclusions, a cosmologically potent material that brought animals to mind and, when interwoven with human agency, brought them into view.

The degree of skill evident in the engraving of animal forms was variable, with the plaquettes reflecting the action of both highly skilled and unskilled artists. A wide range of humans from within the community, including the young and inexperienced, made plaquettes. In contrast, the manner in which the animals were engraved was highly standardised, starting with the line of the back and the head, followed by the chest and front legs, abdomen and back legs, before finally the rump and the tail. When taken alongside evidence for a range of skill, this suggests some form of teaching was likely taking place. Art might have been made communally as a collective activity, with the quality of the final form of the animal depicted less significant than observing the correct manner of depiction. This correct manner of depiction might itself have been cosmologically significant, perhaps undertood as honouring the animals depicted, a lesson as important to learn as the mechanics of engraving. Learning was likely multi-layered, developing artistic skill in engraving, but also a cosmological journeying, depicting the correct animals in the appropriate way to facilitate new and continuing relationships with non-human agents in a deeply agentic world. The specific form of the animal may have been relatively insignificant; plaquettes appear not to have been created to be a permanent piece of art to be viewed, but instead played a role in the mediation of relationships between humans, animals, and things. The act of making and transformation summoned up these relationships, not necessarily the finished form which only evidenced them. Not all animals were chosen for depiction, hinting at complex and perhaps species specific relationships that were mediated in different ways, not all of which involved art. Neither was the form entirely absent of meaning. The animals depicted reflected an awareness of time, depicted with winter fur at a site occupied in summer. This might be in anticipation of animals to be encountered in the future, a reflection on animals encountered in the past, or stylised animals depicted in their prime. The relationship with different species of animals was likely varied and nuanced, with humans organising much of their lives around the seasonal scheduling of other animals. Humans were no doubt sensitive to these seasonal rhythms, likely categorising the animal world in equally nuanced ways, with categories sensitive to behaviour, age, sex, season, and many more criteria besides. Considering human-animal relationships at the level of species may even be too course grained, hiding a rich nuance and a more intimate level of human-animal relationships. The animal forms depicted are highly specific and intentional, regardless of skill. The recognition of their form alone as horse or bison, chamois or ibex likely undervalues a great deal of diversity significant to their interpretation, perhaps not truly appreciable from the outside looking in.

The form of the engraved animal does not appear to have been of central significance, in contrast to the manner in which they were engraved. Following the shape of evocative material, incorporating its form and laying down lines in the correct order, were seemingly more significant considerations. The form of the animal was instead momentary, to be viewed only in the specific context of their creation and use, adjacent to the hearth, the social locus of Magdalenian life. Fire was life in the Magdalenian, providing warmth and light, the ability to cook food, to interact socially as a community, but also the capacity to transform plaquettes. Placed around the hearth, the effect of the evocative morphology of the limestone and bright white engraved lines were enhanced further still, brought to life by the dancing light of the fire, making the animal forms flow and move as if alive. This intensity and vibrancy was temporary and momentary, as was the engraved form itself. Where colour was once used to draw parallels to other materials suitable for the production of art, then to render animal forms clear and distinct, in heating the plaquette it was used to render the art ambiguous. The heat of the fire was used as a transformative medium, gradually obscuring the once vibrant white lines of the engravings with protracted exposure. The heat of the fire further transformed some plaquettes into fragments through thermal fracture. For some plaquettes, this change in colour that rendered ambiguous previously distinct animal forms, and fragmentation, which served to do the same, was the end of their life history. As the flames died, so too did the objects. Left by the fire, only close scrutiny would reveal to any but those who were there, in the moment, the life history and significance of the plaquettes. For some fragments of the plaquettes, this was only one chapter of a longer, unfolding life history. They were moved from the hearth, perhaps even to another site entirely, simultaneously creating new linkages and relationships but binding these relationships to that moment of creation and use, the original meshwork of connections that was mediated in the making and using of the parent plaquettes at Montastruc.

9.3. Object Biography: Assessing the Validity of the Approach

The synthesis of the Montastruc plaquettes acts as a detailed example of the capacity for an object biography to create a deep and nuanced understanding of the material culture to which it is applied. However, does it carry sufficient explanatory power to be considered a useful addition to the broad corpus of techniques and approaches used to interpret Palaeolithic art that already exist? In discussing the validity of the shamanistic approach, Lewis-Williams and Dowson (1988) noted in its merit the capacity to make sense of more of the observed variables in cave art than other interpretive models that had been favoured previously. Using that same criterion, the object biography approach, infused with animistic and relational elements, has gone some way to rethinking observed material modifications for plaquettes. This is further significant as it is these same material modifications that have typically received little critical attention, largely thought to be incidental or insignificant. This theme will be explored in detail in discussing Sieveking's (1987b) synthesis in the sections that follow. As such, the approach is a significant development, worthy of further exploration in different Palaeolithic contexts and working with different bodies of art, on the basis that it has the potential to explain more aspects of the art than current approaches, as defined by Lewis-Williams and Dowson (1988). Several examples serve to highlight this capacity to generate new insights.

At Montastruc, a previously unrecognised detail, that the probable season of occupation of the site, summer, represents a mismatch relative to the season of depiction of the animals depicted in the art, likely autumn/winter, proved to be a significant point in their interpretation. This detail was only appreciated as a result of the implementation of a contextual analysis with an interest in understanding the plaquettes within site context, in this case made possible only through analysis of the broader material culture assemblage from the site. The propensity to study art in isolation, to construe it as part of a fixed category with little interconnection with other areas of Palaeolithic life, would have made such a finding difficult in this case. This temporal mismatch is significant to the interpretation of the plaquettes from Montastruc as it contributes, for example, to the debunking of a hunting magic interpretation of Palaeolithic art popular in the 19th and early 20th centuries (Palacio-Pérez 2010), as well as ecological or teaching aid models that would suggest the art is a passive representation of the observable world (e.g. Mithen 1988a; 1988b; Guthrie 2005).

A further example adds additional support to the notion that the approach can generate meaningful insights when applied to Palaeolithic art. The neurological component of the model poses a challenge to shamanistic interpretations of art. Pareidolia can be experienced by any person of nearly any age at any time and during a typical neurological state. It perfectly harmonises with cultural and experiential variance, with the things observed in the world reflecting areas of deep knowledge in the individual experiencing the pareidolia (Kato and Mugitani 2015; Liu *et al* 2014). It does not rely on specific universal neurologically derived trance that can only be experienced by purposefully altering the conscious state. While the various routes to achieve trance are viable in the Palaeolithic, they typically have little in the way of direct supporting archaeological evidence.

9.3.1. A Challenge to Orthodoxy

By Lewis-Williams and Dowson's (1988) criterion, the approach has value as a result of its capacity to explain more observed phenomena than other approaches to art that have traditionally been used. There is perhaps scope to go further and consider whether the approach is sufficiently effective to warrant challenge of the orthodoxy of approach to Palaeolithic art, as discussed fully in chapter 2.

Of necessity, the approach considered material culture well beyond the art itself, creating contextual frames through the analysis of general trends in the Magdalenian lifeway at the general level (chapter 4), analysing the broader collection of objects recovered from Montastruc by Peccadeau de l'Isle (chapter 5), and comparing specific life histories of organic art and stone art at the site of Montastruc (chapters 6, 7 and 8). These analyses served as a means of trying to reconstruct some sense of context for the plaquettes from Montastruc via comparison with bodies of material culture at different scales. Points of continuity and contrast provided some sense of the choices that were made during the life history of the plaquettes. This method of analysis served to highlight the extensive interconnections between elements of the Magdalenian world. In trying to understand plaquettes, it became necessary to explore each element that interacted with them, framed broadly in the exploration of the relationships between Magdalenian humans, animals and things. For plaquettes at Montastruc, this implicated, for example: relationships to materials and use of tools, the creation and use of colourants, the varied uses of fire, seasonality and how sites might be organised, as well as patterns of learning and the development of skill. By studying Palaeolithic art in isolation, a common strand to orthodox approaches, this richness, how art sat within a broader site, region or period context, is limited.

Orthodox approaches to Palaeolithic art perhaps assume that much of this context has been lost and so there is little value in attempts to explore it or reconstruct it. The approach of exploring art in isolation is justified on the basis of the assumption that the context of art is lost because it is not preserved in perfect detail, or because parietal art is technically dislocated from the broader body of material culture within caves and so will always present as decontextualised to some extent. The approach outlined here is important as it is fundamentally grounded in the realities of the archaeological record. This was the case at Montastruc where there are clear weaknesses that stem from a lack of spatial context for the plaquettes. The context is rarely sufficient to recreate fully detailed life histories of objects. However, the model was made all the richer for exploring broader patterns of material culture and working towards reconstructing some elements of context where possible. While an approach which fixates on the finished form and the visual appearance of the art in isolation is of course valid, indeed vital, with the potential for important observations derived from such a study, this can only ever be a limited understanding of the art in question, constrained to only a single phase of the life history, without broader consideration of the place of art within context. The critiques leveled at orthodoxy are not designed to encourage a simplistic replacement of one approach with another, but rather to encourage the adoption of a plurality of approaches that the complexity of the art demands; a range of approaches reflecting the diversity evident in the art itself.

9.4. Plaquettes Beyond Montastruc: Can the Object Biography Approach Be Used as the Foundation for a New Synthesis of Plaquettes?

The object biography approach encourages a deep understanding of material at a small scale, as outlined in chapter 3. It is this smaller scale where nuance can be realised and subtle aspects of difference in the interplay of social relationships and cosmology can be explored. The emphasis on a small scale of research is typically implicit in such work but is increasingly externalised and outlined as part of the strength of the technique (e.g. Fritz *et al* 2016). This does not preclude synthesis, whether at the regional or yet larger scale, but does encourage caution and a critical awareness of how the synthesis is produced. Synthesis can potentially homogenise a material signature, drowning out the nuance that an object biography reveals, undermining the results and also the reason for its application. The exploration of the broader regional plaquette signature here does not attempt to provide a synthesis based on material traces and the outlining of patterns. Instead, it explores whether the interpretation of plaquettes from Montastruc, using an object biography approach, which embraces and explores those modifications to the material, can highlight areas where further critical analysis should be targeted more broadly. In turn, it explores whether there is scope to apply and develop an object biography elsewhere, along with the animistic and relational framework that have collectively facilitated the successful re-analysis of Montastruc. A major synthesis work produced by Sieveking (1987b), focusing on quantification of material traces in plaquettes across Palaeolithic France and Spain, is used as a point of departure for exploring whether patterns identified at Montastruc are found elsewhere and whether this provides scope for further application of the approach, contributing to the eventual creation of a more nuanced synthesis. Sieveking (1987b) was used as a way to target research questions at the Montastruc plaquettes, discussed in chapter 3, and is the ideal source to use as a case study for this exploration.

9.4.1. Summarising Sieveking's Regional Plaquette Analysis

Sieveking (1987b) produced a survey of plaquettes, totaling some 1,550 examples, from Magdalenian southern France and northern Spain. Her study split this area into four regions: the Pyrenees, southwest France (to which Montastruc belongs), Basque and Cantabric Spain, and Aquitaine and Cantabria (Sieveking 1987b, 4). Much of this sample derives from later 19th and early 20th century excavations; a period characterised, as detailed in chapter 2, by the rapid removal of archaeology-bearing sediments, often without mind to stratigraphic differences, and with little or no recording or associated notes, resulting in minimal spatial or temporal control (Sieveking 1987b, 2). The material from any given site is thus generally a palimpsest, making fine-grained analysis within sites, and comparisons between sites, challenging. As a result, much of Sieveking's analysis relies on stylistic typologies to assess the sameness and difference of associated material from a site, with all of the associated limitations this engenders (Sieveking 1987b, 2-4, 11). In this framework, stylistic homogeneity of an assemblage was taken by Sieveking to suggest contemporaneity of an assemblage, while heterogeneity was taken to suggest mixing of material from different layers (Sieveking 1987b, 11). This constraint saw Sieveking focus on the objects themselves, addressing largely practical questions such as how the plaquettes were manufactured, the nature and subject of depictions, nature of the material, variations across regions and, based on stylistic trends, time (Sieveking 1987b, 4). This limitation highlights the challenge of synthesis and comparison between sites. To do so uncritically would be to perpetuate a reliance on the style of the art in isolation, limiting the synthesis inevitably to a monolithic interpretation built on that specific attribute. Sieveking's observations of material patterns will be considered in light of results from Montastruc.

9.4.2. A Summary of Sieveking's Findings

Sieveking's Southwestern French group consisted of 58 sites and 680 plaquettes (Sieveking 1987b, 141). Sieveking ordered these sites and plaquettes on stylistic grounds, linking each site to a Magdalenian sub-phase. The extent to which this provides an accurate sense of time depth is questionable when based on stylistic attributes alone. This is nonetheless briefly summarised. Sieveking recognised two main centres of plaquette production, the Dordogne and Tarn-et-Garonne, both characterised by Magdalenian IV material (Sieveking 1987b, 141-143). Material from Bruniquel, Laugerie Basse and La Madeleine each show evidence of Magdalenian IV plaquettes, with some V and VI (Sieveking 1987b, 145). Other sites in the region were typically found to be younger. Only very occasionally were pieces suggested to be older based on style, around 10% of plaquettes in each region (Sieveking 1987b, 24). The majority of the plaquettes (78% or 1209) were thought to date to the Middle to Late Magdalenian (Sieveking 1987b, 23). Sieveking (1987b, 23) suggested there was some spatial patterning within this date range. Plaquettes from southwest France were attributed to Magdalenian VI, the Pyrenean plaquettes to Magdalenian IV, and Aquitaine and Cantabria to Magdalenian VI (Sieveking 1987b, 23).

Sieveking (fig 9.1.) found that there were several different materials used to make plaquettes: limestones, sandstones/schists, pebbles, and bones, with differences in the material utilisation by region. Limestone was the most common material in southwest France while sandstones and schists were the most common in the Pyrenees. While some of this relates to the available material in any given region, Sieveking suggests at least some may relate to specific choice (Sieveking 1987b, 28). Once selected, a material was often then only used to make plaquettes (Sieveking 1987b, 27). Method of working was also

Figure 9.1.

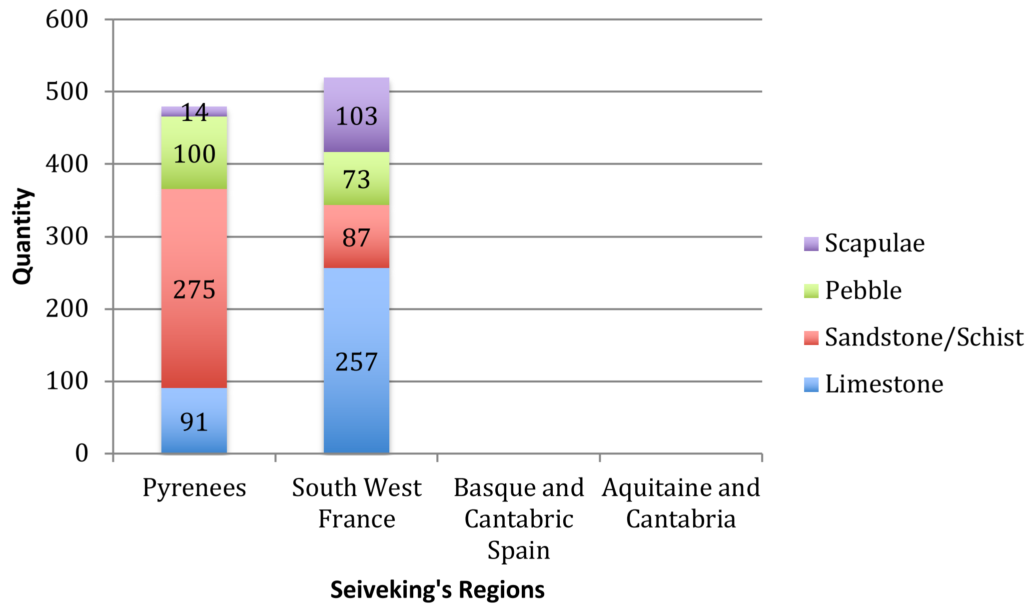

Figure 9.1. showing a graph of Sieveking's material counts by region. It is clear that while all material are used in those regions for which data is available, there is specialism by region, especially limestone in south west France and sandstone in the Pyrenees. Data derived from Sieveking 1987b. Image: author.

variable by material. For example, low relief techniques were found to be associated with sandstones, while deep incisions were associated with limestone (Sieveking 1987b, 54). Sieveking divided plaquettes into three main size grades: <100mm, 100-300mm, and >300mm, all measured at maximum extent. Sieveking (1987b, 54) found (fig 9.2.) that while all regions conformed to a pattern of plaquette size generally falling below 300mm, with the majority of those <100mm, southwest France contained a greater quantity of pieces in the >300mm category.

Sieveking noted the number of decorated surfaces found on each plaquette in each region

Figure 9.2.

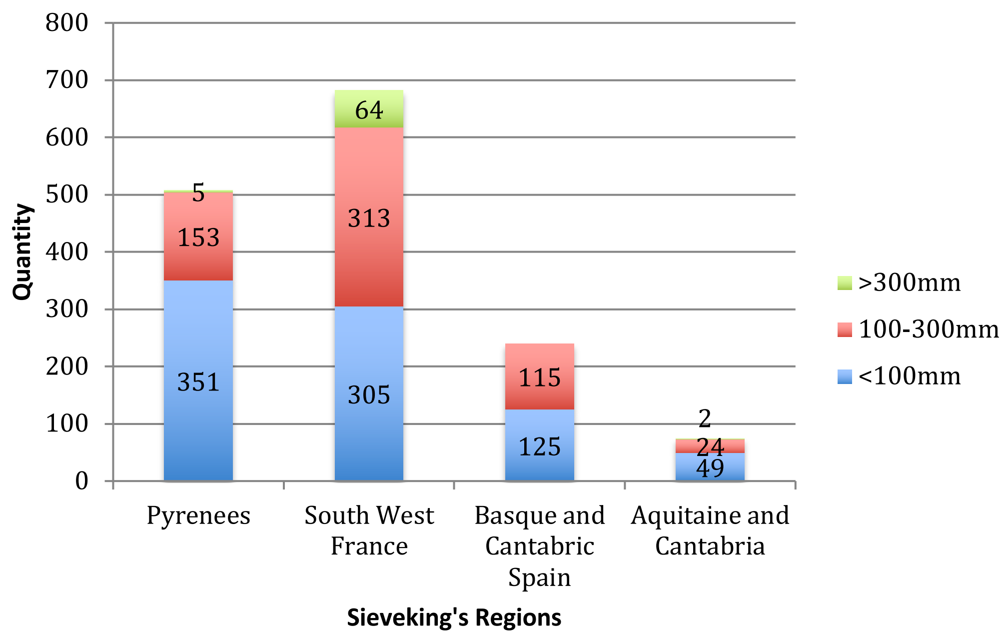

Figure 9.2. showing the breakdown of plaquette support size by region. Plaquette size is typically below 300mm in all regions, though there is a larger number of larger plaquettes in south west France. Data derived from Sieveking 1987b. Image: author.

(fig 9.3.). Southwest France stands out as a prominent region in this regard with almost double the number of recorded decorated surfaces than the nearest other region, the Pyrenees. Repetition of forms, or multiple depictions alongside one another, appears to have been a common phenomenon in the southwest French plaquettes, varying in frequency from as little as 25% to as high as 50%, depending on the specific site and period, as are superimpositions and inversions (Sieveking 1987b, 82, 86). Sieveking (1987b, 84) suggests that depictions that can be considered complete, such as a depiction of a complete animal, are a common trend. This was especially true of southwest France where they are especially frequent at the beginning of the later Magdalenian IV, receding through

Figure 9.3.

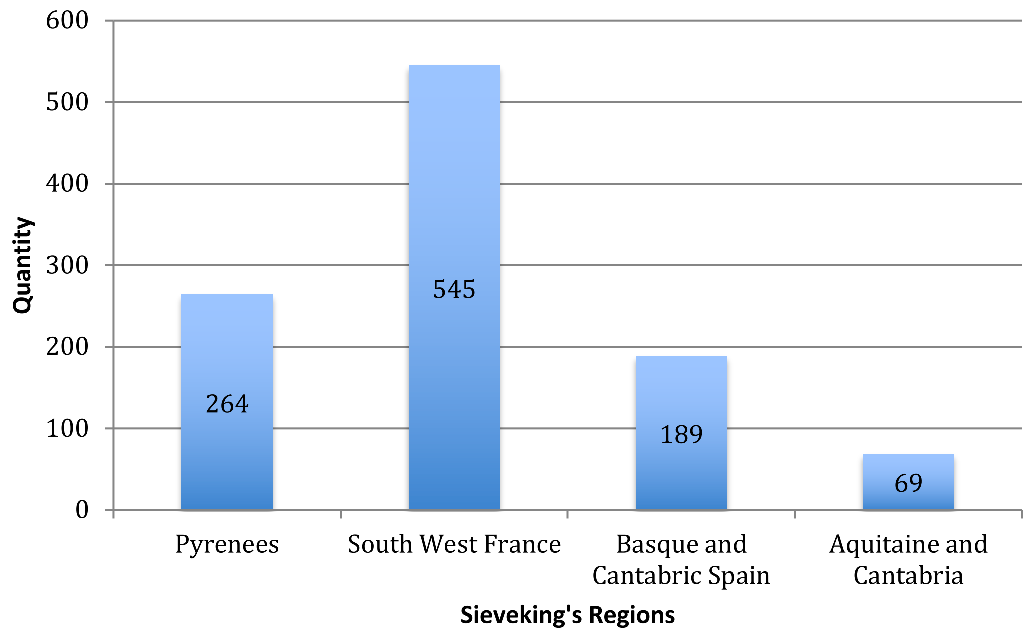

Figure 9.3. showing the quantity of decorated by region. Plaquettes are most heavily populated with multiple depictions in south west France. Data derived from Siveking 1987b. Image: author.

time, and in the later Magdalenian VI in the Pyrenees and Basque and Cantabric regions (Sieveking 1987b, 84). By contrast, incomplete figures, where particular parts of animals are depicted for example, were found to be uncommon across all regions and periods, never exceeding 15% (Sieveking 1987b, 84). The size of the depiction(s) was also explored in relation to the available space on the support. Depictions were split into large, moderate and small. Large depictions were defined as filling the whole space, moderate depictions as leaving enough space to be repeated once, and small depictions as leaving enough space to be repeated multiple times (Sieveking 1987b, 76). Large engravings were found to be common throughout the Late Magdalenian in western France (Sieveking 1987b, 77). This trend is similar in Basque and Cantabria and outside Aquitaine regions, though these regions do potentially show a gradual decline in large designs through time (Sieveking 1987b, 78). By contrast, the Pyrenees region displays the reverse (Sieveking 1987b, 77).

Sieveking also assessed the specific character of the art, as well as its raw number. Plaquette depictions were divided into abstract, schematic and naturalistic types. Naturalistic designs, such as animals drawn with accurate anatomy and proportion, yielding a design recognisable to species, would appear to be the dominant trend in each of the regions considered and especially common in southwest France (fig 9.4.). Comparing the schematic decoration to the naturalistic (fig 9.5.), the former was comparatively rare. It should be noted that where naturalistic decoration was least frequent, the Pyrenees, schematic decoration was the most prominent. As with many of the other trends in the assemblage, southwest France stands out as presenting the greatest quantity of plaquettes

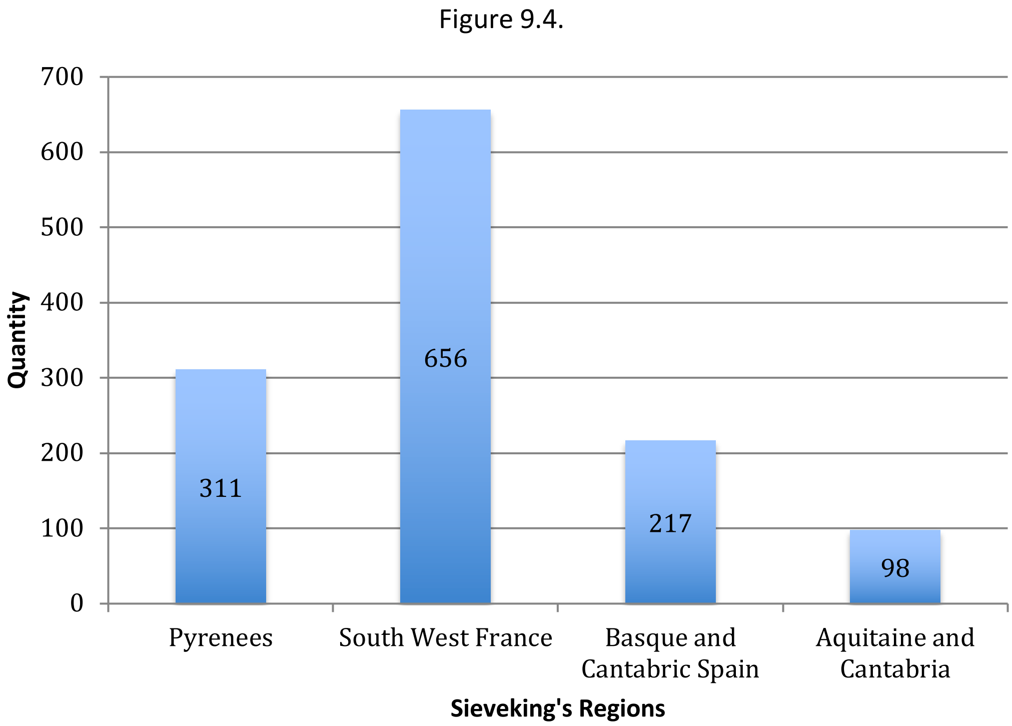

Figure 9.4. showing the quantity of naturalistic animal depiction by region. Naturalistic depiction in common in all regions but especially so in south west France. Data derived from Sieveking 1987b. Image: author.

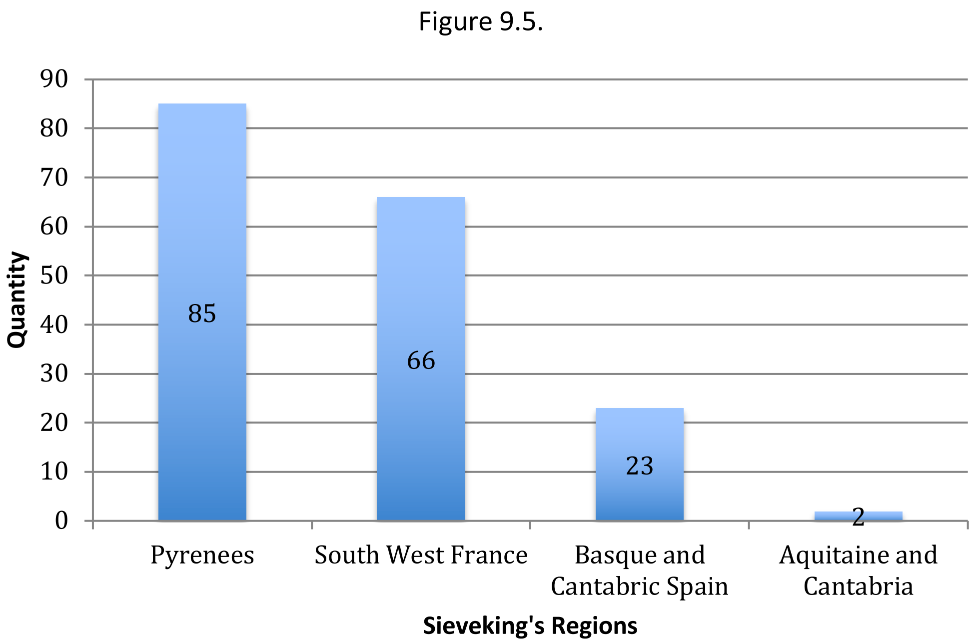

Figure 9.5. showing the quantity of schematic animal depiction by region. Schematic depiction is relatively common in all regions but occurs at a significantly reduced rate when compared to naturalistic depiction (fig. 9.4.). Data derived from Sieveking 1987b. Image: author.

that conform to this pattern. In some instances, a design has been wrapped around another surface, producing a 3D effect in some pieces. This seems to be a stylistic trait largely limited to southwest France (Sieveking 1987b, 126). As well as the entire design, variance in the depiction of specific body parts was also considered. Eyes were variously depicted as round, ellipsoid, triangular, ringed, or 'eye with line', the latter two almost entirely limited to western France (Sieveking 1987b, 110). Eyes were entirely absent in some cases (Sieveking 1987b, 110). A range of depiction styles was also identified in the feet, ranging from single feet in profile, correct pair, blob feet, through to their complete absence (Sieveking 1987b, 111). Manes were also depicted in diverse styles (Sieveking 1987b, 111- 112).

Sieveking found that animal depiction was common and that a range of species was depicted in different quantities (fig 9.6.). Cervid and horse represent the most common species depicted across all regions, and especially common in southwest France. In no region did the animals depicted exactly mirror the local ecological setting. For example, depictions in southwest France typically lack fish, birds and lions, all of which would have been present in the environment (Sieveking 1987b, 92). There was a large quantity of depictions that remained indecipherable even after dedicated analysis. While this may reflect taphonomic action obscuring these depictions after burial, it could also reflect differences in skill across different materials (Fritz *et al* 2016). Sieveking found that the design of depictions sometimes evidenced a range of working strategies to try and achieve particular effects. For example, the use of multiple outlines in creating a design was common, especially in southwest France, and was perhaps used as a device to create a sense of movement and dynamism (Sieveking 1987b, 53, 74). Some plaquettes also showed evidence of colourants, especially common to limestone plaquettes in southwest France (Sieveking 1987b, 4).

Figure 9.6.

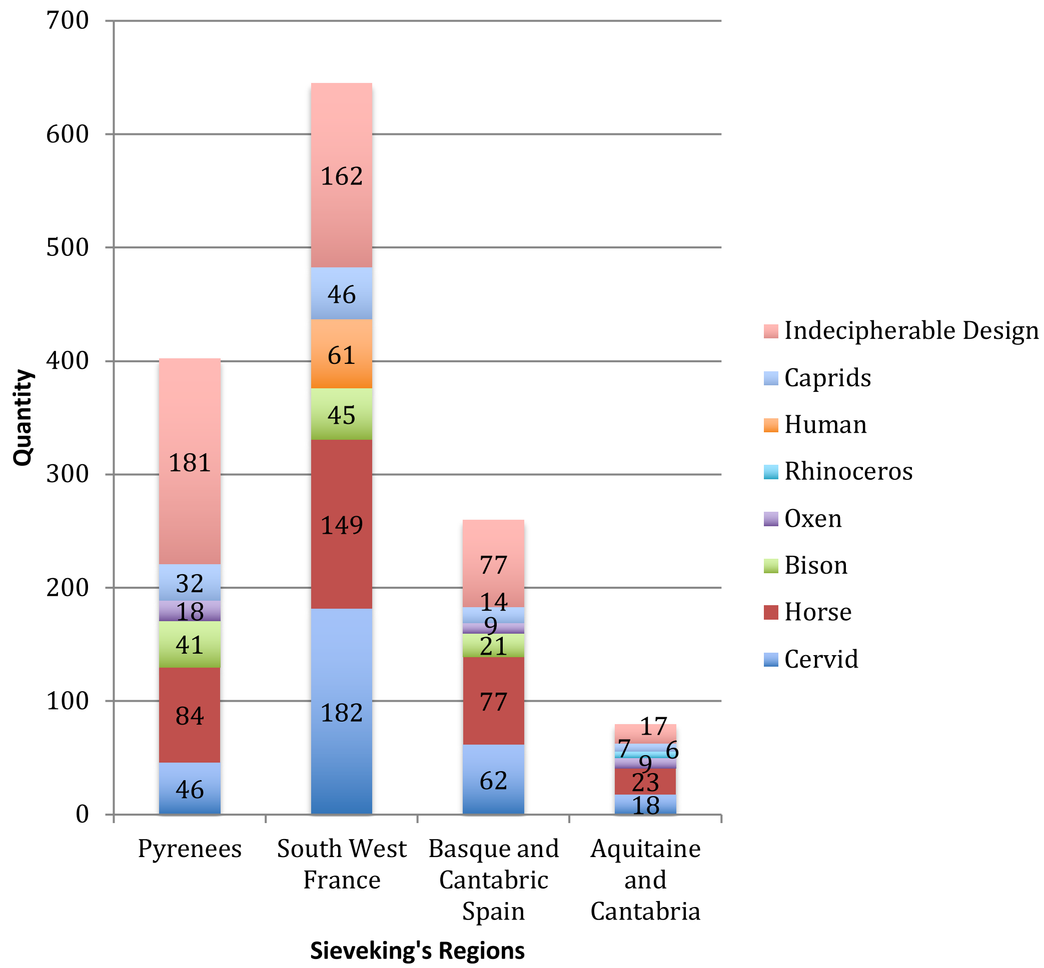

Figure 9.6. showing the quantity of various species depicted by region. Data derived from Sieveking 1987b. Image: author.

Sieveking also noted the presence of 'signs', such as geometrics, arrows or lines, on some of the pieces, derived from all regions. Compared to animal depiction, this was relatively infrequent, never more than 10% of the sample, but could be much higher when considering specific regions and periods of time. For example, during Magdalenian VI in the Pyrenees, Sieveking (1987b, 128) found that the depiction of signs increased to 54% of the assemblage (Sieveking 1987b, 128). In some cases, both animal depictions and signs were found on the same plaquette. Sieveking (1987b, 115) reports that this is a rare occurrence, with 59 surfaces in the sample displaying this association. Again, this pattern was considered to be sensitive to time and space. For example, Sieveking (1987b, 114) found that the association of different types of designs, such as schematic 'darts' or 'spears' with naturalistic animal figures found to be common in southwest France and the Pyrenees during Magdalenian IV.

Sieveking further identified a range of common modifications to plaquettes, including heating, fragmentation, the application of colour, traces of wear, and traces of use. These modifications are summarised in turn. Many of the plaquettes show traces of burning in the form of colour change and thermal fracture, with the specific features evident to each plaquette varying based on the degree of heat and proximity to the heat source (Sieveking 1987b, 12-13). Where contextual information is known, plaquettes were typically found to be spatially proximate to combustion features, such as hearths (Sieveking 1987b, 12-13). Sieveking (1987b, 13-14) speculated that this pattern might be linked to both pragmatic and more meaningful practices. Hearths were suggested to be linked to production and the requirement for light in a dark space (Sieveking 1987b, 14), though perhaps also an intimate component in their use and meaning, bound up in the social and interplay around the fire (Sieveking 1987b, 13).

Sieveking (1987b, 34) reports that the fragmentation of plaquettes was infrequent, never rising above 10% in a given region. However, fragmentation was reported as challenging to establish, especially in stone (Sieveking 1987b, 34). The primary cause of this fragmentation is reported as anthropogenic action (Sieveking 1987b, 35)**.** It was typical for fragments to be missing from a site. Sieveking (1987b 13) does not interpret this definitively, raising the possibility of taphonomic action, but also highlighting Movius' suggestion that objects might have been 'killed', with fragments subsequently transported. Those sites that display plaquette collections buried far into caves or rockshelters often display these same patterns, perhaps suggesting that placement and transport was intentional and quite significant (Sieveking 1987b, 14).

Sieveking (1987b, 74) reports that the addition of colourants, usually in red or black, was present across all regions and time periods but rarely exceeded 25% at any given time or place. Taphonomic bias and recent anthropogenic modification through aggressive cleaning are likely to have decreased the number of objects displaying evidence for colourants. For example, many early pieces have been cleaned and handled since their excavation and some early excavators report that the water used to clean the objects turned a bright red during the task (Sieveking 1987b, 74).

Sieveking (1987b, 37) considers wear to be a locally variable phenomenon, bearing little resemblance from site to site or region to region (Sieveking 1987b, 37)**.** 32.1% of limestone pieces showed signs of wear in southwest France (Sieveking 1987b, 47). The nature of the site may have had some role in the quantity of objects that displayed traces of wear. Sieveking (1987b, 38) identifies that open-air sites will be subject to greater post-depositional activity, including action by solifluction and freeze-thaw, and some of this wear and variability in the pattern of wear may be linked to these factors. Perhaps linking to patterns of wear, Sieveking (1987b, 40) notes possible signs of use in some of the plaquettes in the form of battering, chipping and pecking, and flaking (Sieveking 1987b, 40). This pattern possibly reflects a functional usage for at least some of the plaquettes, most likely those made on pebbles, with the traces likely being an unintentional pattern generated as a byproduct of the use of the plaquettes as a tool. These traces are likely to be under-represented as early researchers generally failed to comment on patterns of this nature (Sieveking 1987b, 40).

Sieveking (1987b, 15) considers all other traces to be secondary and to be free of any interpretive significance; the pieces were likely deposited after decoration, with breakage, burning and similar traces of limited direct interest, if significant at all, and likely stemming from taphonomic processes (Sieveking 1987b, 15). This is compounded by the possibility of primary and secondary usage of the object, with many of the traces that do not relate to the art directly perhaps reflecting different practices that occurred after the decoration, which might have been separate from it (Sieveking 1987b, 15).

9.4.3. Synthesis: But Synthesising What?

Two points emerge from Sieveking’s synthesis of French and Spanish plaquettes and together they encapsulate the challenge of synthesis, linked to the nature and scale of the analysis undertaken. Sieveking’s analysis can be characterised as revealing a clear and repeating pattern of plaquette treatment. Plaquettes are typically made from soft stone or bone, they are engraved and painted, typically with animals or signs, and reflect a range of artistic skill. They are frequently subject to heating as a result of their association with combustion features and are frequently found to have been subject to ancient breakage. Plaquettes are typically affected by some type of post-depositional modification, as well as use and wear, especially in more open conditions. Superficially, there are clear points of resonance between the results of analysis from Montastruc and Sieveking’s synthesis at the multi-regional and larger temporal scale. However, Sieveking suggested that many aspects of material modification of plaquettes was insignificant, such as fragmentation, heating and breakage, with her analysis focusing primarily on the style of the plaquettes to try and date and order plaquette collections at the regional scale. The results of the Montastruc analysis, a site included in Sieveking's synthesis, challenge these conclusions. These same attributes were found to be potentially deeply meaningful at Montastruc. That there are points of resonance in material modification between the Montastruc plaquettes and other plaquettes discussed by Sieveking perhaps suggests that the results of the object biography analysis of the Montastruc plaquettes resonate beyond the spatio-temporal context of the specific site and assemblage considered. Indeed, the underpinnings of those patterns, an animistic ontology and the negotiation of animals, humans and objects through the plaquette as a locus of these entities, might too be a broader theme with explanatory power in the Magdalenian. Parallel analyses of other types of art support this suggestion (e.g. Birouste *et al* 2015). Similarly, it might encourage the broader application of an object biography approach to other plaquette collections.

The temptation at this stage, based on these potential associations, might be to superimpose the results of the analysis from Montastruc onto the patterns identified more broadly by Sieveking, to re-interpret the results and generate a new synthesis of plaquettes at the regional level or even multi-regional level. However, this is premature for several reasons. Sieveking's synthesis does not in itself encourage a broad-brush re-analysis of art according to the interpretation generated for Montastruc on the grounds of parallel material treatments. To do so would be to sacrifice the context and nuance woven into those material signatures that an object biography approach specifically sets out to capture at an intimate scale. To blanket an interpretation on other sites based only on the analysis of Montastruc would be to create a new monolithic interpretation of plaquettes. It was these same monolithic interpretations the object biography approach was designed to deconstruct, acting as an alternative that was sensitive to context and nuance. Each site considered by Sieveking, and indeed beyond, would instead benefit from a similar application of an object biography approach: it is the *approach* that can be applied more readily, not necessarily the *results of that approach* at this stage. The approach has proven effective in problematising and recontestualising the life history of plaquettes, even when derived from sites with poor supporting context. The occurrence of similar patterns of breakage, heating, painting and more, would suggest that the approach generated could be an effective tool in deepening knowledge about plaquette collections beyond Montastruc, even if those collections were generated via the poor excavation standards of the 19th or early 20th century.

While particular material modifications look superficially similar, their similarity can only meaningfully be assessed after their detailed analysis on a case-by-case basis, in context. For example, whether breakage, heating and fragmentation was always the product of intentional anthropogenic action is an open question with a potentially highly variable answer between sites, sub-periods and regions of the Magdalenian. It is perhaps only with further applications of an object biography approach, applied site-by-site, collection-by-collection, that such a question can be resolved. A meaningful synthesis can perhaps only be achieved after such applications, where nuanced, fully realised object biographies can be compared at each stage of their life history. As discussed in relation to heating in chapter 8, quite similar physical traces presenting on a plaquette might have been generated via quite diverse means. Scaling this insight to Sieveking's synthesis, the challenge becomes apparent: Breakage is not simply breakage, heating is not simply heating, engraving is not simply engraving. There is a vast wealth of variation within each specific material modification that collectively allow for the tracing of potentially highly diverse and distinct plaquette biographies, even in the presence of superficially similar material signatures. Here the results of Montastruc, the product of a fully realised object biography, are useful in acting as a set of *testable hypotheses* that can be used as a point of departure in inspiring other plaquette object biographies, and when subsequently comparing such biographies.

There is great potential in studying specific collections at the small, local scale. This is overlooked; perhaps due to the challenge of reconstructing some sense of context, typically compromised or all together missing in historically excavated archival collections. However, the approach has demonstrated a viable method of rebuilding some of this missing context to facilitate a meaningful analysis at the smaller scale. A shift to the smaller, forensic scale, where human choices and gestures can be explored within plaquette production is beginning to receive more attention, in part inspired by parallel work on stone tool collections (e.g. Pigeot 1990). For example, Tosello, author of a chaîne opératoire of plaquettes from the Périgord (Tosello 2003), has similarly advocated for the avoidance of the creation of new monolithic arguments, instead favouring a move toward a forensic level of analysis to explore small-scale nuance and variation (Fritz *et al* 2016). The future of plaquette studies rests, in the first instance, in small-scale analysis. When a critical threshold of sites have been thus analysed, a significant and meaningful regional synthesis can be contemplated, sensitive to small-scale change and variance.

9.5. Object Biographies and Palaeolithic Art at the Broader Scale

Approaches to art typically follow an orthodoxy in which the visual, how the finished art looks in isolation, is construed as the locus of meaning. The pursuit of the visual in isolation, at the cost of any other attribute of the art, has shaped how art has been interpreted and understood (chapter 2). This has led to a series of overarching, monolithic interpretations that blanket all art, each new model replacing the next, wholesale. Models are often leveled at parietal art preferentially, construed as a meaningful category and the clearest signal of art in the Palaeolithic. As the majority of models begin from the same foundation, pursuing art in the same way, the capacity to interpret is restricted by the same assumptions, reflecting orthodoxy deeply entwined with a western worldview and conception of art, rather than established fact. An interpretation is typically applied to all art, regardless of period, location, or specific contextual considerations. Can the meaning(s) of art be discerned if the fundamental structure of how art is approached always remains static; unquestioned orthodoxy fused to a western worldview and a western conception of art with a strong emphasis on how art looks in isolation? It is conceivable that working within this framework strips the capacity to reveal meaning before attempts to analyse and interpret have even begun. If the starting assumptions implicit within this structure prove to be incorrect, everything built on that assumptive foundation is also brought into question. A rigid adherence to this framework, a failure to fully explore alternatives, might hinder rather than help continuing attempts to understand Palaeolithic art. This is of course true of the alternative suggested in this research. However, by diversifying rather than simply replacing approaches to art, by manipulating the starting assumptions and making them an active and transparent part of the research, there is perhaps scope to discover more about Palaeolithic art and its meaning. This is not to advocate for a simple replacement of previous approaches to art, or to offer a sweeping discrediting of decades of careful research. It is instead to highlight how these approaches have been formulated and why (chapter 2), to challenge that orthodoxy and formulate effective alternatives (chapter 3), and demonstrate the effectiveness of those alternatives in generating new insights and a fuller understanding of the art under investigation (chapters 4-8), to facilitate further analysis. In contrasting the approach to the orthodox framework, there are points of strength that scale beyond the strict application to Montastruc and perhaps encourage further application to other art collections.

9.5.1. The Object Biography Approach: A Valuable Tool for Art Analysis Beyond Montastruc?

The plaquettes from Montastruc are in many respects typical of many Palaeolithic art collections excavated during the 19th and early 20th centuries. The Montastruc material culture record has limited associated spatial context as a result of rapid and unsystematic excavation and limited associated supporting written records. Due to their rarity and fragility, contemporary storage conditions in museums necessarily place strict controls on how objects can be researched, whether in terms of handling, transport of objects, or techniques that can be employed in their study. The approach developed to work within these limitations was outlined in chapter 3 and advocated a *decentring* of art, exploring the materiality and life history of the plaquettes through a relational framework, inspired by non-western understandings of animals, humans and objects. The approach to the plaquettes from Montastruc set out in previous chapters aimed to move beyond a directly visual and non-contextual analysis. Instead it explored the making, using and depositing of the plaquettes. This revealed significant new insights. Part of what made this analysis possible was the attempt to recontextualise the plaquettes by building increasingly delimited contextual frames, starting with an assessment of the Magdalenian lifeway, moving on to an assessment of all material culture found at Montastruc by Peccadeau de l'Isle, and finally understanding the plaquettes in contrast to organic art during different phases of the life history of each type of art. The plaquettes were understood as a knot in a meshwork, and by exploring the broader material context, the meshwork of strands that go into their making and using, the plaquettes could be understood anew. The use of non-western conceptions of the world derived from ethnography alongside rigorous techniques, notably 3D models, and working through a life history approach, facilitated the exploration of art without fixation on any single component of the life history and associated orthodoxy in how the art should be studied and interpreted. Such an approach is necessarily contextual and embedded within it is a means of creating some semblance of context, even in collections where this has been compromised. The interpretation is correspondingly specific and linked to the context and objects it explains, with only limited scope for direct, wholesale application to other contexts. However, the routeway pursued in formulating an approach that can extract value from a collection without context, and with limitations in how the material can be studied, has the potential for application to other similar collections. That Montastruc is quite typical of archival collections – split across museums, handling and access restrictions, fragile with limited scope for the application of some techniques – suggests that the approach could be a valuable tool in the analysis of other archival collections with similar limitations surrounding historical and research context. Further, the application of the approach in a sub-optimal context serves as a useful stress test; application to a context with good preservation, excavated to contemporary standards, would only improve the quality of the resultant interpretation. The approach may not be appropriate for all types of art but it is a tool of potential value beyond the immediate confines of its application in this research.

9.5.2. Challenging Orthodoxy: Extracting Value from Historic Archival Collections

One of the major questions in approaching this research was whether value could be generated from collections that have limited associated context. Collections are curated at significant expense, at least some of which is typically public money, but most collections have not been subject to rigorous and detailed study, typically lacking complete publication and with only limited application of new, non-destructive techniques. For example, the majority of the Montastruc collection that has been presented, especially in chapter 5, has never been published before, or only in summary form for the majority of the art pieces (Cook 2010; Farbstein 2013a; Sieveking 1987a), despite having been curated for almost 150 years. Similarly, the Bétirac collection, material derived from a later series of excavations in the 1940s, has only been published in summary (Bétirac 1952) and is now difficult to access for the purposes of research. The lack of attention given to archival collections in general risks creating the false association that a pattern of only sporadic study implies the collection has only minimal research or public value. In truth, it more likely reflects the challenge of trying to undertake such a study, with necessary restrictions imposed by museums to ensure the long term safety of the objects, the nature of the excavation generating limitations, linked to its quality, that are difficult to circumvent, or the collections being split across numerous institutions and museums. Accepting previous results as beyond question simply on the basis of the difficulties and limitations imposed on further attempts at study serves ultimately to limit the capacity to understand Palaeolithic art. However, the alternative, working only with recent sites excavated to modern standards, is an equally limiting solution as Palaeolithic art recovered during the 19th and early 20th centuries make up a significant component of all known Palaeolithic art. In exploring anew archival and historic collections, the application of rigorous, repeatable, non-destructive techniques, alongside creative theory, reflected in an object biography approach, is significant. The question is not whether these historic collections have value, but rather how to extract what value there is in spite of the limitations imposed by their historical treatment. The research framework explored here, both theoretical and technical, contributes to this goal, demonstrating that the study of archival collections can be worthwhile and contribute new knowledge, without recourse to monolithic, decontextualised models of art.

9.5.3. Animistic and Relational Ontology: Object Biography Beyond Art?

An approach that utilises relationality and a reimagining of the ontological status of animals, humans and things, alongside exploring the full life history of art offers explanatory power in Paleolithic art, where these domains typically overlap. While variability can be anticipated with changing material culture type and the context in which these material cultures are found, this in itself is a significant advance, challenging monolithic interpretations of art derived from the uncritical acceptance and application of western norms, manifest in the very divisions between these categories. Specific analysis of the entire life history of art reveals a rich range of contributing factors to its creation and use, and while there is clear evidence that an interpretation of art is scalable and applicable to art in other contexts, this is perhaps best considered through parallel applications of the approach to other bodies of material culture rather than of the interpretation directly, following the same routeway to allow specific variations in the life history of art from different times and places to emerge. This is perhaps also true of the supporting strands of the object biography approach employed in the reconsideration of plaquettes from Montastruc: animistic and relational ontology.

Animistic and relational ontology poses an important challenge to orthodoxy within Palaeolithic art research and compliments an emerging research trend which is increasingly interested in materials, methods of working, and the assessment of meaning (e.g. Conneller 2011; Farbstein 2011a; 2011b; 2013a; 2013b; Porr 2015; Porr and Bell 2012; Porr and de Maria 2015; White 1992). The shift away from one dimension of art, the visual, is a significant development in moving towards a deeper understanding of how art fits within the Magdalenian lifeway. Further application of the approach would benefit Palaeolithic art research, as well as other aspects of the Magdalenian lifeway. While a contextual approach would necessarily be subject to modification when applied to other bodies of material culture, there is scope for its broader application, the approach highlighting deep interconnections between aspects of the Magdalenian world. As much as a deeper understanding of art was made possible by exploring patterns evident in the Magdalenian world, the reverse is also true, with art having a role to play in informing those elements in which it might be implicated within a particular context. Chapter 4 highlighted several themes within the Magdalenian record beyond art that might benefit from a similar analysis based on a non-western relational approach. These potential areas of application are raised to further highlight areas to which this approach might be especially well suited for further application beyond other collections of plaquettes. While tentative, this might represent an important alternate to the default, inherent western framework.

The focus on the head evident in Magdalenian mortuary practice (Orschiedt 2013; Pettitt 2011), reviewed in chapter 4, is of interest, not least because it overlaps with a potentially parallel special treatment of the head in at least some animals, such as horses (Birouste *et al* 2015). Contours découpé are also interesting in this respect, being manufactured from the hyoid bone of a horse and almost always depicting the head of a horse. There is perhaps scope to make the case for a significance in the material chosen and the animal depicted, forging a non-trivial connection between animal part and resultant object, more truly an animal-object (Conneller 2011, 204). This fixation on the head is perhaps further evidenced by the creation of skull cups in the Magdalenian. The example from Gough's cave (Bello *et al* 2011; Bello *et al* 2015), discussed in chapter 4, is not unique. Further examples are present at other sites in Europe, especially at the site of Le Placard, France, and in greater number with some 24 examples recovered (Pettitt 2011, 218). The parallel treatment of animal teeth and human teeth, the special focus towards the head in both humans and animals, and the making of objects from human body parts, in a manner which parallels the production of objects from animal body parts, all imply a deeply entwined relationship in the Magdalenian between animals and humans, to the point where the category difference might carry a different weight in different contexts. These entanglements might benefit from further specific exploration through an animistic ontological framework to tease out nuance in these relationships at specific times and places. The suggestion that animism may have some neurological basis (Helvenston and Hodgson 2010a) perhaps encourages the exploring of the temporal and geographical depth of this way of understanding the world. While it is likely to always be mutable by specific context, it may be an important alternative starting position to an assumed western inherent framework, and has proven complementary to an object biography approach, especially in encouraging the questioning and rethinking of the seemingly trivial or mundane.

9.6. Summary

The approach employed brought together non-western perspectives on the world, alongside high-resolution non-destructive techniques, articulated through a relational object biography framework. This allowed theory and technique to articulate at the scale of specific research questions and at different stages of the life history. It also allowed for detailed analysis of assemblages that had otherwise been deemed of low priority and of limited academic value due to poor historical excavation and lack of context, by virtue of their lack of consideration. The application to Montastruc, one such site that conforms to this model of limited research value, revealed significant nuance and detail in material modification to plaquettes that had been disregarded as insignificant in Sieveking's (1987b) monolithic synthesis. That this approach has generated significant new insights into plaquette life histories in a collection with limited context is an endorsement for its continued exploration within Palaeolithic art and beyond. The approach poses an important challenge to established, orthodox approaches to art, both in its active questioning of implicit and unquestioned western approach to the material, but also regarding the scale of research and assumptions surrounding which aspects of art should be the target of analysis. The approach is by no means a wholesale replacement for pre-existing approaches to Palaeolithic art. However, it does represent a potentially useful tool warranting further critical exploration. Such further application to other bodies of Palaeolithic art, and conceivably beyond, may eventually facilitate new, meaningful syntheses, sensitive to small-scale contextual patterns in specific collections, as well as broader trends that unite object classes across time and space.

Chapter 10. Conclusions and Future Research

Chapter 10. Conclusions and Future Research

10.1. Conclusions

The aim of the PhD was to analyse the Montastruc plaquettes from an object biography perspective, infused with theory informed by insights derived from non-western cultures, notably animistic ontology, alongside the use of materiality and relationality, combining to decentre the art and move beyond an understanding of its visual appearance alone, especially in the domain of the mediation of social relations at Montastruc, whether between humans, humans and animals, or humans and things. This theoretical approach was supported by attempting to reconstruct some sense of context for the site of Montastruc through the analysis of other object sets from the site, and the application of non-destructive techniques in analysing the plaquettes to facilitate quantification wherever feasible. Research proceeded by critically assessing the history of Palaeolithic art, how it has been categorised and interpreted, and how these approaches were shaped by the roots of its discovery and initial analysis, leading to a highly traditional, orthodox approach to art, shaped by an inherent western perspective. Exploring the non-western as an alternate compensated for this bias and allowed for the capacity to see the art in a new way, encouraging a deep reading of context to understand choices made in specific object life histories. 3D models in turn facilitated this analysis, both in practical terms by allowing greater analysis of objects that cannot be handled or moved, but also by helping to shift attention beyond the engraving itself, capturing a high resolution image of the whole support that proved pertinent to understanding the plaquettes. In creating context and comparing different types of objects from the site, the life history of the plaquettes could be understood in relation to other bodies of art from the site. The site itself could also be better understood through comparison to broader patterns in the Magdalenian lifeway, further enhancing the understanding of the plaquettes by providing a sense of where they were made and used.

At a broader scale, attempts to reconstruct some sense of context in the Montastruc collection through the analysis of trends in the history of Palaeolithic art, the Magdalenian and the assessment of a diverse set of objects from Montastruc proved fruitful and the approach shows potential for similar application to other sites with poor context. Indeed, the approach seems ideally suited to exploring the increasingly strong signature of possible art pieces in early hominin species that would necessarily require a depth of scrutiny to asses whether they were art, and will more typically be found in sites with a compromised context by virtue of their age. The application of new techniques and insights from anthropology has proved to be one successful approach to *decentring* Palaeolithic art, recasting the significance of the visual and the finished form within a broader object life history. The application emphasises that when working with Palaeolithic art there is *more than meets the eye* and that a reconstruction of context, as far as is possible, is an important foundation to the analysis of Palaeolithic art assemblages. Similarly, the use of new digital techniques has proven useful in forwarding research efforts.

The application of the approach to Montastruc was in essence an extended case study to assess its efficacy, though the results of this application, both in analysing and further understanding the site and specifically interpreting the plaquettes, are themselves significant. This application of the approach proceeded with the aim of trying to recontextualise an essentially unstratified site, and rebuild as much of the activity from it as possible through a broad analysis of all objects recovered by Peccadeau de l'Isle stored in the British Museum. In applying this approach to Montastruc, it was found that plaquettes were deeply socially significant, and possibly made, used and deposited around hearth structures at Montastruc, given traces of burning not seen in other material culture types from the site. They were likely made by a diverse range of people, reflecting a broad uptake in production and use, with some possibly made by children, or certainly the inexperienced. The case was made for the importance given over to production and to performance, based on the relative lack of central concern with the finished form. The engraving was often shaped by a desire to make it fit within the evocative shape of the material, highlighting that material was active in the formation of art. It was argued that plaquettes, when explored biographically, offer a window into a cosmological system where humans, animals and objects were understood to be deeply significant and entwined in complex ways. This understanding of the world was underpinned by an ontological framework in which non-human elements could come to be understood as agents in their own right, capable of holding complex relations with humans. This shaped how the plaquettes were made, used and deposited, structured through specific systems of ontological logic that fed into the cosmological sense of the world.

While the analysis of stone plaquettes from the site is of interest in itself, it in turn acted as a detailed and fully realised case study, highlighting the potential for such an approach to be employed more broadly in Palaeolithic art research and perhaps beyond. This approach challenges an interpretive orthodoxy fixated on monolithic interpretation and structured through the visual that has been pervasive since the very discovery of Palaeolithic art in the mid 19th century. In rebuilding context, Montastruc, by virtue of its age, became a lens through which to shed light on the role of history and tradition in analyses of Palaeolithic art and the need to consider a new framework, a decentring of the visual within an object biography approach. This was highlighted in reflecting back on the synthesis produced by Sieveking (1987b). Many material patterns were found to be similar to those found at Montastruc, such as high rates of burning and fragmentation. However, it is only through further application of an object biography approach that nuance and context can be woven into these patterns, facilitating a meaningful synthesis where small-scale similarities and differences can be explored. To this end, the research has been successful in meeting its primary aim. The greater insights about plaquettes from Montastruc evidence the potential to increase understanding of other types of Palaeolithic art if researched in a similar way. Other plaquettes already summarily analysed by Sieveking (1987b) would be an obvious starting point for such a research programme. The potential for applying this approach to other Palaeolithic art bearing sites is significant and has the potential to be an important tool in future research efforts across periods, and perhaps even across species to embrace an increasing early hominin art record.

10.2. Future Research

As in any piece of research, what remains after the attempt are perhaps still more questions than answers about the site of Montastruc, the engraved stone plaquettes and their place in the Magdalenian world. Research could progress along numerous lines and at multiple scales, some of which are discussed further below. Suggested areas of expansion move from the specific, detailing further research at Montastruc directly, to the broader scale, informing research beyond the site into the Magdalenian and beyond, as well as aspects of archaeological practice.

10.2.1. Application of Further Techniques to the Montastruc Plaquettes

The research context surrounding the plaquettes from Montastruc limited the range of techniques that could be employed in their analysis. It can be anticipated that this will be true of any curated collection to some extent and is a necessary component of their continuing conservation. Further non-destructive techniques might be employed to increase knowledge about the Montastruc collection. H-RTI was not included in a recent summary of digital techniques applied to Palaeolithic art analysis (Plisson and Zotkina 2015) but it has showed great promise in applications to art with fine engraving (e.g. Milner *et al* 2016), while other studies have focussed on 3D models (Güth 2012) or micro-CT (Bello *et al* 2013). The exploration of H-RTI and a comparison against 3D models already produced would be a logical extension of the techniques used in this study. Such an application could serve to inform the broader discussion of which techniques can be used with greatest effect when encountering different materials, worked in different ways, and deposited in different archaeological and research contexts.

While the research context is likely to continue to pose limits on the types of techniques that can be applied to the plaquettes from Montastruc, this research has highlighted a series of research questions, most notably surrounding colourants, which could likely be resolved by the future application of pXRF/pXRD or raman spectroscopy to assess specific chemical composition. Alternately, DStretch, which is entirely non-destructive and can be carried out with the manipulation of photographs through dedicated software to assess the presence or absence of pigment and its state of preservation (LeQuellec *et al* 2015), might be used to recognise, quantify, and assess colourants on plaquette surfaces. These techniques are a significant development as the nature of colourants is not always apparent from observations with the naked eye or low powered microscopy.

10.2.2. Actualistic Experimental Replication

The use of actualistic experimental replication to explore patterns of working would develop the current body of research substantially. It would allow results generated during analysis of archaeological objects to be tested against replica pieces produced under controlled conditions. Experimental replication (e.g. Santos da Rosa *et al* 2014) can be used to complement microscopic analysis, with, for example, the actualistic replication of grooves and engraved compositions facilitating understanding of production (Fritz 1999, 191). The use of experimental archaeology in this case would have provided a baseline for fresh engravings with stone tools from the limestone in the Aveyron, facilitating assessment of post-depositional wear. It might further have facilitated some assessment of skill and types of marking, allowing for some development of the argument surrounding the variance of skill evident from the site. Most significantly, a microscopic comparison of experimentally engraved surfaces would have provided a point of reference for line order analysis, assessing the fresh surfaces with lines produced under known conditions to allow for a more detailed assessment and comparison of archaeological examples. The analysis generated thus far provides a detailed sense of the life history of the objects, limiting the variables and shaping the experiments that might be conducted. With the application of experimental archaeology, this picture could be further refined and with greater confidence. The resources involved, as well as the wide array of variables to consider at each step in the object biography ensure this will be a labour intensive but ultimately highly rewarding endeavour. To analyse the replicas produced using the same protocols as the archaeological specimens would contribute substantially to the creation of not only a comparative experimental data set for plaquettes from Montastruc but also facilitate the potential to begin building a digital experimental database of working signatures on different materials using varying techniques. In turn, this could substantially inform further Palaeolithic art research, as well as spatio-temporal variance in patterns of working, facilitating the analysis of further assemblages of Palaeolithic art.

10.2.3. Expanding the Analysis: Object Biographies of Organic Art

A parallel, fully realised study of the organic art assemblage at Montastruc would further contribute to the understanding of the varying roles of art at the site. While selected pieces of the organic art assemblage have received recent attention (Cook 2012; Farbstein 2013a) the assemblage has not been explored in detail from a single, unified approach. Bringing this component of the assemblage to the same standard, so all pieces have received full and detailed discussion, would allow for a yet more detailed analysis of the differing object biographies of organic and stone art. Differences within the object biographies of varying types of organic art might also be realised. The high rates of recent breakage within this collection, caused as a result of removing objects from boards to which they were glued for display, is a compelling example of the need for high resolution digital proxies when dealing with objects of this rarity. Adopting the approach for the organic collection would provide these high-resolution digital proxies and facilitate the creation of a complete, high-resolution digital archive of fully manipulable 3D models for the complete art assemblage from Montastruc.

With research into Magdalenian barbed points and harpoons being an expanding area of interest in recent years (e.g. Langley 2014; Pétillon 2008; Pétillon 2015; Pétillon and Ducasse 2012), an expanded analysis of the collection from Montastruc could be a significant contribution in this research field. Many of these studies contain reference to the French-held component of the Montastruc collection excavated by Bétirac but are missing the Peccadeau de l'Isle component, potentially impacting upon the results. Only a basic description based on macroscopic observation could be provided as part of this research, but further specific research at the level of detail expressed in published works would facilitate regional comparison. It would also contribute to a more detailed model of the temporality of the site and technological signature of the region, with harpoons and barbed points being temporally diagnostic artefacts.

10.2.4. Research on New Collections and Reuniting Split Collections

The benefits of the creation of a photographic archive and at least minimal analysis and discussion of all objects from the Peccadeau de l'Isle component of the Montastruc collection stored in the British Museum, along with 3D models of the plaquettes, is the facilitation of uniting the collection with those artefacts recovered by Bétirac, stored in Le Musée d'Histoire Naturelle Victor Brun, France. A full analysis of the reunited collection, whether physically or digitally through publication and sharing of digital data, would contribute significantly to the understanding of the site and any given material culture set derived from it. Such a project could be a catalyst for further projects to reunify split collections using the same approach.

The approach has been found to possess merit and is very much applicable to other, similar collections. Sieveking (1987a) notes, in catalogue form, the entire corpus of Palaeolithic art held in the British Museum, each of which might benefit from a similar analysis. These collections would be a potential place to begin further research. All objects have received some analysis and categorisation, and as the same research context applies, the approach could be applied without change, refined and improved according to the needs of each collection. These collections would similarly benefit from re-unification, in whatever form, with holdings in France. The analysis of further collections in the UK could lead to the eventual re-unification of collections overseas through the sharing of digital data, even if this must remain a medium to long-term goal on practical grounds. Recent papers (e.g. Paillet and Man-Estier 2011) reveal that parallel studies on historic collections are being conducted in France, supporting the case for trying to research split collections jointly and using techniques to facilitate digital sharing of data. The creation of high-resolution 3D models would allow for dissemination between colleagues, avoiding the problem of limitations to access that has emerged as a result of collections becoming split across institutions, often in different countries. This might contribute to the capacity to study whole collections rather than parts, which would naturally increase the quality and accuracy of any research produced. The utilisation of 3D models and 3D prints can be disseminated to other museums to create a complete, shared, digital assemblage, accessible to host institutions in which a component of a collection is stored, facilitating international and inter-institutional research. Many museums, including the British Museum, have already begun to experiment with hosting 3D models online to allow members of the public to view and manipulate them. This could be a novel way to present the collection to the public in the future, supporting existing efforts to create searchable digital archives of museum holdings.

10.2.5. Digital Technology, Palaeolithic Art, and Public Engagement

Tosello and Villaverde (2014) anticipate that the use of digital methods to analyse art will be an area of rapid expansion in future years. 3D Models can be highly effective when used in the analysis of highly complex and often ephemeral art such as plaquettes that create a negative profile on the support. While they hold potential in facilitating research between Palaeolithic specialists, they also hold potential in engaging the public and enhancing museum displays. This is especially pertinent with plaquettes. Decoration can be difficult to identify and interpret without direct engagement with the object and typically using manipulable oblique light sources to highlight details of engravings. This potential for engaging the public was tested using 3D model stills with light sources manipulated to make the art stand out, and 3D prints taken from the high resolution models. A non-specialist audience was invited to interpret what animals were present on selected plaquette surfaces using these resources. Results of how these different techniques aided their attempts were recorded in an exit survey (fig 10.1., fig 10.2., fig 10.3.). The results of the exit survey revealed that regardless of the medium used, participants found trying to identify engraved animal forms on plaquettes to be challenging to some extent. However, participants responded positively to being able to try and interpret and enjoyed engaging with the 3D models and the art conveyed through the posters. In addition, the survey revealed that respondents developed a greater sense of what archaeologists do as a result of trying to interpret the plaquettes using the same techniques used by the archaeologist. These results, though drawn from only a very modest population of 36, can be taken to tentatively suggest that the use of 3D modeling technology, alongside 3D printing, could be an important way in advancing attempts to engage the public with a more diverse range of art through active handling and interpretation of high quality replicas.

Figure 10.1.

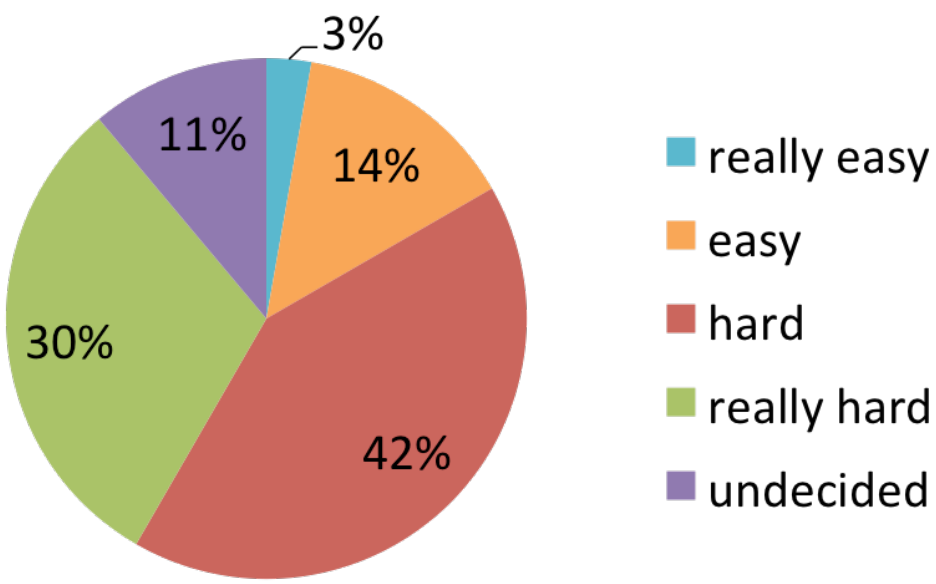

Figure 10.1. showing the attitudes of participants in response to how difficult they felt identifying the engraving on plaquettes was when presented with photographs. Image: author.

Figure 10.2.

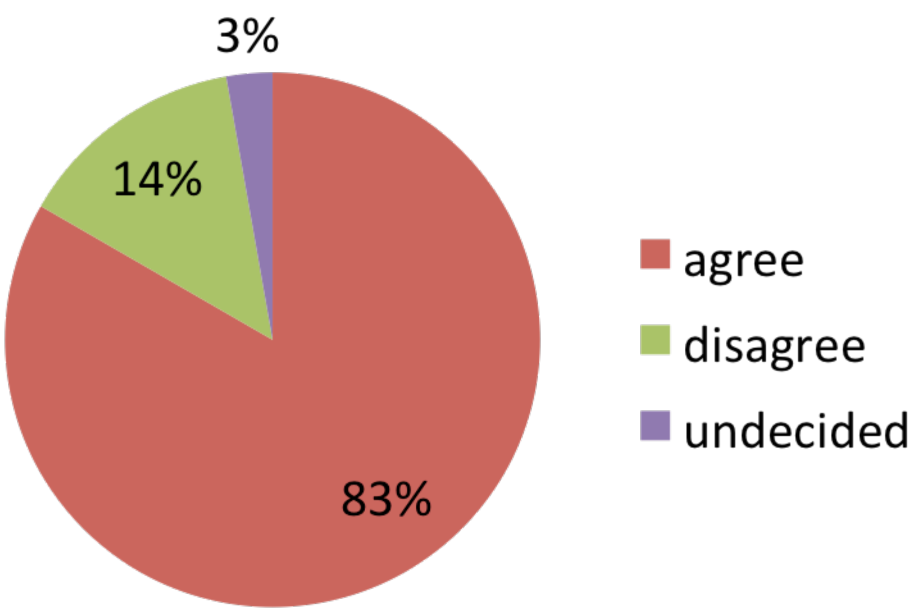

Figure 10.2. showing responses of participants when asked if the attempt to find engraved animal forms for themselves with 3D model still, photographs and 3D prints was fun and engaging. Image: author.

Figure 10.3.

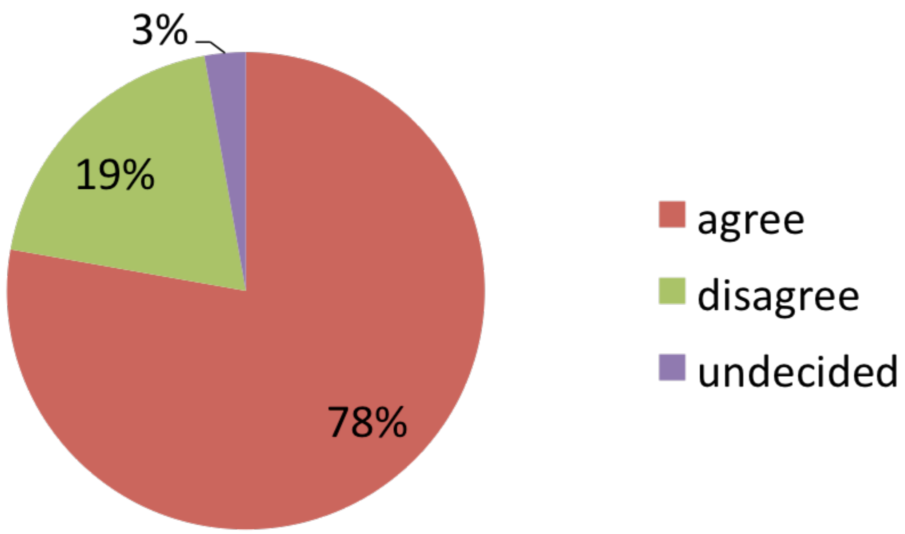

Figure 10.3. showing the responses of participants when asked whether working independently to identify engraved animal forms with 3D model still and 3D prints helped them understand what archaeologists do. Image: author.

10.2.6. Further Application of Animistic Ontology and Object Biography

There is scope for further application of animistic ontology and object biography to other aspects of the Montastruc collection, but also beyond into other Magdalenian art assemblages. There is no reason to limit the application to the domain of art. Other types of material culture have been revealed during the PhD that might benefit from analysis through an object biography perspective, highlighted in the discussion. Neither is there a restriction in limiting application to humans. Palaeolithic art is an increasingly multi-species phenomenon, with mounting evidence for an artistic capacity in *Homo neanderthalensis* (Finlayson *et al* 2012; García-Diez 2015; Marquet and Lorblanchet 2003; Morin and Laroulandie 2012; Rodriguez-Vidal *et al* 2014; Rodriguez-Vidal *et al* 2014; Roebroeks *et al* 2012; Romandini *et al* 2014; Peresani *et al* 2011; Peresani *et al* 2013; Peresani *et al* 2014; Pike *et al* 2012; Pike *et al* 2016; Radovčić *et al* 2015; Zilhão 2007; 2012; Zilhão *et al* 2010), the Denisovans (Derevianko *et al* 2008), and perhaps even as far distant as *Homo erectus* (e.g. Currie 2011; d'Errico and Nowell 2000; Joordens *et al* 2014). Approaches to this body of art perhaps understandably focus on the cognitive, demonstrating the species in question had the capacity to make art and imbue it with symbolism, and the comparative, understanding the art of other species in relation to the artistic expression present in humans and typically whether it attains a cognitive threshold reflective of a symbolic capacity, broadly construed as integral to definitions of behavioural modernity (Nowell 2010, 440-441). The approach provides a method to analyse art from early hominin species contextually, taking into consideration broader bodies of material culture, as well as geared towards extracting information from collections with limited or compromised contexts, which can be expected in possible cases of art that are hundreds of thousands, if not millions of years old. The approach is not in opposition to cognitive approaches, rather it brings focus to the broader context of the possible art, both material and socio-cultural, and emphasises the need to explore the full life history of the possible art to understand its significance within that socio-material milieu.

The extent to which an overtly animistic ontology is applicable to early prehistoric contexts is open to question, though the possibility should not be dismissed out of hand. It is worth noting that the case for Neanderthal art is increasingly strong and seems to be clearly fixated on the utilisation of feathers and talons, elements that closely accord with the key actions of flying and hunting performed by large birds of prey in the world (Birouste *et al* 2015). This linkage between the manifestations of art through animal parts that accord with animal action could well indicate some degree or form of an animistic worldview amongst Neanderthals. As a clearly cognitively complex species, living in similar circumstances as humans, reliant on animals and their rhythms to survive, it wouldn't be surprising if animals figured prominently in how Neanderthals negotiated their physical and spiritual world. This was perhaps made manifest through the use of animal parts in art. The point here is that in a cognitively complex species, there is no need to strand art objects in debates surrounding cognition alone when they could provide significant insights into cosmology or social relationships, for example. In order to identify such relationships, art must be analysed through an approach sensitive to identifying such traces through the careful plotting of the life history of the specific objects in question.