The Place of the Neanderthal Dead

Multiple burial sites and mortuary space in the Middle Palaeolithic of Eurasia

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Abstract

The research examines Neanderthal fossil sites containing more than one individual and investigates the existence of Neanderthal mortuary spaces, a place associated with death, among them. An overview of Neanderthal fossil sites with respect to the number of individuals indicates that almost 50% contains more than one individuals. The ones with more than five individuals are studied in detail concerning the main features of mortuary space: multiple burial, spatial organization and temporal restriction. At least three sites (La Ferrassie, Shanidar and Amud) appear to be mortuary spaces. On these sites multiple burial and spatial organization are evident but temporal restriction is hard to detect in the existing documentation. No general patterns were detected but traditions within sites are clear. Local natural elements are highly involved in burial structures and in spatial organization, indicating creative landscape use, which could account for the locality of traditions. The existence of mortuary space suggests modernity in Neanderthals behaviour. It also implies that mortuary behaviour emerged gradually and existed in elaborate ways in other species than ours.

Samenvatting

Het onderzoek betreft Neanderthaler-vindplaatsen waar fossiele resten van meer dan een enkele individu gevonden zijn. Deze worden bestudeerd in het licht van funeraire ruimtes: met de dood geassocieerde plekken. Een overzicht van het aantal gevonden individuen op vindplaatsen met skeletresten van Neanderthalers toont aan dat bijna 50% van deze meerdere personen bevat. Vindplaatsen met meer dan vijf individuen zijn gedetailleerd geanalyseerd met betrekking tot de hoofdkenmerken van een funeraire plek: meervoudige begravingen, ruimtelijke organisatie en afgebakende periode van gebruik. Ten minste drie vindplaatsen (La Ferrassie, Shanidar and Amud) blijken funeraire plekken te zijn. Meervoudige begravingen en ruimtelijke organisatie zijn duidelijk aantoonbaar, maar afgebakende periodes van gebruik zijn moeilijker te traceren op basis van de bestaande documentatie. Algemene patronen zijn niet af te leiden; echter, tradities per vindplaats hebben wel degelijk bestaan. Lokale natuurlijke elementen worden sterk betrokken in de grafstructuren en in de ruimtelijke organisatie; dit toont creatief landschapsgebruik aan, wat wellicht het lokale niveau van tradities veroorzaakt heeft. Het bestaan van funeraire plekken suggereert dat Neanderthalers modern gedrag vertoonden. Daarnaast impliceert het dat speciaal gedrag met betrekking tot de dood geleidelijk ontstaan is en ook onder andere menssoorten in ontwikkelde vorm heeft bestaan.

1. Introduction

1.1. The importance of studying mortuary behaviour

Death is the most universal aspect of life. It is the universal impact of death, however, that accounts for the incredible cultural diversity in reactions to death (Metcalf and Huntington 1979). Mortuary behaviour and mortuary practices are crucial elements of human societies. All recent ethnographically described societies have more of less elaborate rituals of death, which exhibit a wide variety of mortuary behaviour. However, even within a single society reactions to death can vary. Despite the universality of the overall phenomenon, neither universal modes of feeling, nor universal underlying sentiments have been detected through anthropological studies: Death is a time for the expression of strong emotional response but cultural differences provide a variety of emotions and activities (Metcalf and Huntington 1979).

Mortuary behaviour and mortuary practices are generally ascribed to 'modern behaviour', which comprises (1) abstract thinking, (2) planning depth, (3) behavioural, economic and technological innovativeness and (4) symbolic behaviour (Nowell 2010). If is often assumed that mortuary behaviour and practices, including burying the dead, is a unique trait of *Homo sapiens.* However, there has been extensive research into similar phenomena in other human species, primarily Neanderthals (Pettitt 2011;Defleur 1993;Binant 1991). Such research points out that the subject can be instrumental in understanding past human societies.

Investigation of mortuary practices among other hominins could contribute to the understanding past species and societies. Firstly, mortuary behaviour indicates the cognitive capacities of a species, including self-awareness and consciousness of life and death. Secondly, it reflects social aspects of a society, such as caring for the group, cooperation and often empathy. Thirdly, it shows cultural aspects of a society, e.g. identity, values and worldview. In addition, studying the evolution of mortuary behaviour could shed light on

the origin of religion and modern behaviour, which could have arisen out of practical or symbolic funerary activities in a distant past.

1.2. Evolution of mortuary behaviour

Little is known about mortuary behaviour and mortuary practices among other hominins and there is no consensus yet about it. Theories about deep roots of mortuary behaviour in evolution oppose those that explain funerary activity as a recent and modern phenomenon. On the one hand, studies of other animals suggest that mortuary practices extend beyond the human lineage. On the other hand, some researchers, e.g. Gargett, claim that mortuary practices did not occur among premodern humans but started with Anatomically Modern Humans, the *Homo sapiens.*

The passage below describes mortuary behaviour in African elephants, as witnessed by Cynthia Moss. Elephants appear to know the concept of death; moreover, they seem to have activities associated with it (Pearson 1999).

> "They stopped, became tense and very quiet, and then nervously approached. They smelled and felt the carcass and began to kick at the ground around it, digging up the dirt and putting it on the body. A few others broke off branches and palm fronds and brought them back and placed them on the carcass" (Moss 1988, 270).

Similar observations have been made of other groups of elephants and even more of primates, in particular chimpanzees. These indicate awareness of death and certain responses to it by both individuals and groups. The passage below describes the reaction of a group of chimpanzee to the death of one of their females, Tina, who died from a leopard attack.

> "We arrived at 8.17 and found six males and six females sitting silently near the body. The males showed some aggressive behaviour by displaying the nearby and by dragging the corpse over short distances. Ulysse hauled it over two metres and Brutus pulled it back to where it had been before, about five metres away from the place where the attack had taken place. Kiri, Poupée, and Ondine, all high-ranking females, were nearby as well, and the smelled Tina's wound and some leaving the on the ground. Ulysse rapidly inspected one of Tina's hands, holding it. Four females carefully approached the body, which was now guarded by the males and Ondine,

> the alpha female. Malibu smelled the body, while the infant Lychee was chased away as she approaches. Malibu, as had done all the others, smelled the body near the wound, but did not lick them. At 8.30 Macho lay down and started to groom Tina for the first time. Brutus did the same from the other side. Ricci, a low-ranking female, smelled the body, but Ondine and Brutus chased her away […]. During a period of 1 hour and 20 minutes, Ulysse, Macho, and Brutus groom Tina's body for 55 minutes. This was unusual because neither Ulysse nor Macho were ever seen to groom Tina alive […]. Nearby, subadults and low-ranking females inspected with great intensity the place where the attack had taken place and where the ground showed clear traces of a fight with traces of blood […]. From 10.10 onwards, the flies on the body were numerous and started to be a nuisance for the chimpanzees. They waved them away frequently and remove the eggs lad in the nose, eyes and wound of the neck […]. All females of the community came back to look at the body, the males strayed generally for longer and Brutus remains without interruption 40 hours and 50 minutes, except for 7 minutes" (Boesch and Boesch-Achermann 2000), 248-9).

Pettitt (2011) recently proposed a scenario for the evolution of mortuary behaviour. Although mortuary behaviour did certainly not evolve linearly, the development and increasing variability seems to be cumulative in nature and can be divided into five phases: the *core mortuary phase*, the *archaic mortuary phase*, the *modernising mortuary behaviour phase*, the *modern mortuary phase* and the *advanced mortuary development*. These phases will be described below.

According to Gargett (1999, 2000) and Gargett *et al.* (1989), mortuary practices did not occur among premodern humans. His critique focuses on deliberate burial in the Palaeolithic. Gargett claims that the criteria for recognizing Palaeolithic burial are ill-defined and that the most frequent arguments in favour of burial, preservation or presence of a pit, could also be explained by sedimentology, stratigraphy and taphonomy.

1.2.1. Core mortuary phase

The core mortuary phase involves kinds of behaviour concerning death that today can be witnessed in the animal world, mostly among primates, in particular chimpanzees. As chimpanzees are our nearest genetic and behavioural relatives, they are often seen as behavioural reflections of our

ancestors, Miocene hominids and Pliocene hominins. Whether by convergent evolution or by sharing generalized hominid behaviour, primates offer a behavioural model that might be taken as a baseline for the origins of mortuary activity in hominins (Pettitt 2011).

This phase is characterized by intellectual interest in the corpse as well as consumption of body parts under certain social conditions. More specifically it includes (Pettitt 2011, 15-16):

a) Manifestation of mourning as an act of detachment, including signs of depression, calls and carrying of corpses.
b) Socially mediated *morbidity*. Morbidity is defined as an enquiring concern with the injured, diseased or dead body, often including grooming.
c) *Cronos compulsion* of *infanticide* and *cannibalism*: the physical extent of morbidity, which consists of bringing physical changes to the corpses of the dead. It is defined as the urge to dismember, injure or consume part of the bodies of one's conspecifics. Infanticide is defined as the killing of dependent offspring, arising from both ecological advantageous reasons and social pathology of the perpetrator.
d) *Social theatre* or funerary gatherings around the corpse, including controlled access to the corpse, display of the corpse and involved behaviour not witnessed under other circumstances.

The elements of core mortuary behaviour can be divided into those that belong to the realm of the living –the *life sphere*– and those that relate to interest in and communication about the dead body –*the death sphere*. Three overlapping realms can be distinguished and can be divided in these spheres of life and death, as modelled in Figure 1 (Pettitt 2011, 15-16).

1. *Communication*: information flow about the dead body, responses of individuals and of the group.
2. *Social theatre*: renegotiation of social ties in the new context presented by the removal of the dead individual by the living.
3. *Morbidity*: an enquiring concern with the injured, diseased or dead body, often including grooming.

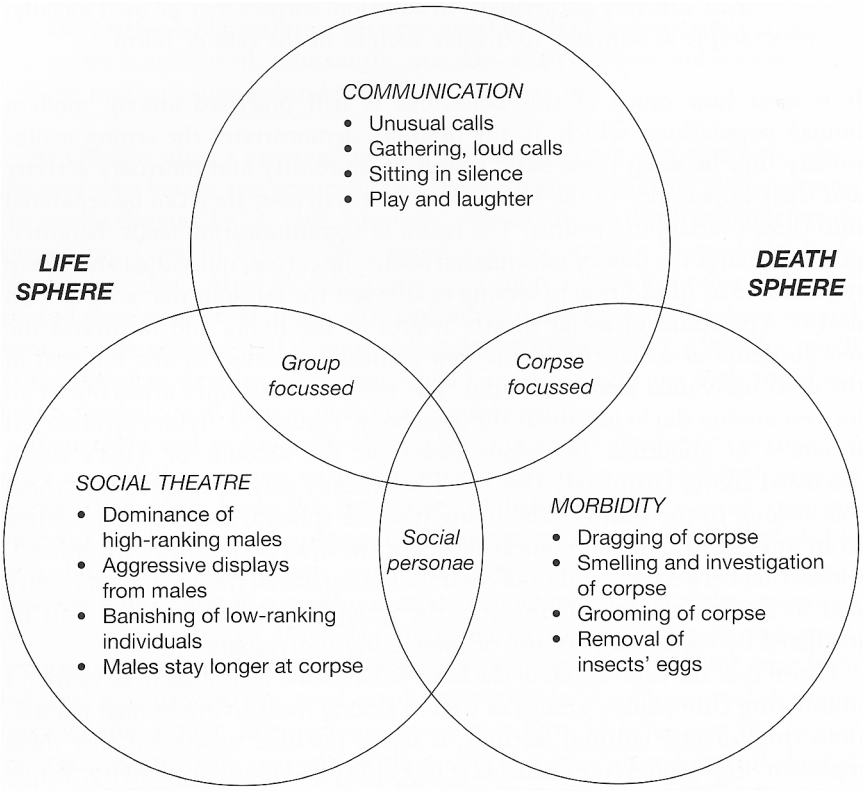

Figure 1 Model of core mortuary behaviour divided into realms and the spheres of life and death (Pettitt 2011)

Although motivation cannot be directly demonstrated, core mortuary behaviour appears to reflect the expression of emotional responses to death. Morbidity and its extension, Cronos compulsion, could arise from a desire to understand the nature or the cause of death of an individual, possibly as a survival strategy. It could also arise from social tension, as death can cause

profound changes in the social order, especially among individuals with a close relationship to the departed (Pettitt 2011).

1.2.2. The archaic mortuary phase

The archaic mortuary phase occurred among australopithecines and early *Homo* until the origins of *Homo sapiens.* Morbidity, mourning and Cronos compulsion were continued and elaborated. In addition, the landscape was incorporated into mortuary activity. The development of mortuary practices from the earliest hominids through to the earliest members of the genus *Homo* seems to focus on the body and on the landscape (Pettitt 2011).

Probably arising from an extension of morbidity as witnessed among chimpanzees, the fossil record of the earliest hominids shows examples of intentional processing of the body. Cut marks on hominin fossils could indicate Cronos compulsion. The Middle Palaeolithic ancestors of both Neanderthals and Anatomically Modern Humans could be responsible for these. It is not possible to ascribe a function to these practices. Both practical and ritual motivation could have stimulated processing of the body. Various reasons for defleshing corpses could include nutritional cannibalism, curation, mutilation or funerary procedures (Pickering*, et al.* 2000). Some fossils, e.g. those from Atapuerca, Gran Dolina, display patterns in cut marks similar to butchery patterns on faunal remains, which would indicate consumption of soft tissues (Pettitt 2011;Fernández-Jalvo*, et al.* 1999;Díez*, et al.* 1999;Bermúdez de Castro*, et al.* 2008).

Structured abandonment, funerary caching and anthropogenic accumulation of corpses are visible in the fossil record: deliberate or structured deposition of the dead at certain parts of the natural landscape, essentially marking a conceptual link between the dead and the landscape. This happened possibly around 500.000 BP in Atapuerca, Sima de los Huesos, where at least twenty-eight individuals assigned to *Homo heidelbergensis* were found. The accumulation is interpreted neither as attritional nor as catastrophic. The

only archaeological remains with which they have been found in context, consist of one biface (Pettitt 2011).

An even earlier example is Hadar, where thirteen individuals assigned to *A. afarensis* were found. Pettitt (2011) interprets this as an early form of funerary caching. The Pontnewydd Cave in Wales contains fifteen Neanderthals, dated at 225.000 BP. At Castel di Guidi, Italy, remains have been found of six to eight *Homo erectus*- and *Homo neanderthalensis*-like hominids, dated at 300.000-340.000 BP. These could indicate funerary caching by early Neanderthals. When the moment of structuring mortuary behaviour in space occurred, the landscape became dichotomised: places associated with life contrasted places associated with death. As observations of chimpanzees avoiding places where conspecifics died reveal, it could have been inevitable in human evolution to ascribe meaning to places where death occurred. These developments are carried on into the earliest *Homo neanderthalensis* and *Homo sapiens* populations. The movement and structured abandonment of corpses at particular points in the landscape, notably away from areas of intense activity, may reflect some conscious desire among early hominids to afford the dead a special last resting place or minimize the chances that the dead might become prey to scavengers (Pettitt 2011).

1.2.3. The modernizing mortuary behaviour phase

The modernizing mortuary behaviour phase arose in the Middle Palaeolithic and Early Upper Palaeolithic among *Homo neanderthalensis* and *Homo sapiens*. Cronos compulsion, morbidity, mourning and funerary caching were continued and the social theatre around the corpse was elaborated. Funerary caching turned into formal burial, also including multiple burials. Some use of material culture as adjuncts to burial are found, e.g. possible grave offerings, stone markers, covers and ochres (Pettitt 2011).

1.2.4. Modern mortuary phase

The modern mortuary phase, occurring in the European Mid Upper Palaeolithic and Early Upper Palaeolithic, comprised continuation of Cronos compulsions, morbidity, mourning, funerary caching and elaboration of the social theatre around the corpse. Places in the landscape were clearly associated with the dead and there were places of multiple burial. There was clear use of material culture as adjuncts to burial. This phase also included use of human relics and thus commemoration, elaboration of burial types, intricate rules for burial as containment, recognition of the status of the dead in mortuary ritual, association of new phenomena with burials (e.g. fire, symbolism, art) and the first signs of continental-scale general practices (Pettitt 2011).

1.2.5. Advanced mortuary development

Advanced mortuary development, occurring among *H. sapiens*, comprised firstly persistence of the elements of modern mortuary phase, their spread to new areas of world and increasing regional and cultural variability. Secondly, formal cemeteries emerged, defined as recognition of exclusive areas for the dead and the collective representation of death. The eventual notion of 'normal' (i.e. standardized) burial may have only come about with the agricultural ways of thinking, including increased sedentism, aggregation and investments in land (Pettitt 2011).

The earliest known *Homo sapiens* burials are situated in the Levant and predate the Neanderthal burials. At Skul, an Israeli site dating to 100.000-130.000 BP, at least ten individuals have been buried. Some of them have been interpreted as formal burials, as the human remains are well preserved and situated in shallow natural and artificial pit, laying in a foetal or sleeping position. Another early example is Qafzeh, also in Israel. Here, hominid remains of at least thirteen individuals are possibly deliberately buried between 90.000-100.000 BP (Pettitt 2011).

1.3. Previous research

The idea that Neanderthals were burying their dead was initially suggested in order to explain why relatively complete and articulated skeletal material was found at some sites. With the discovery of La Chapelle-aux-Saints (Bouyssonie*, et al.* 1908) Neanderthal burial became more accepted and was seen as an indicator of the 'humanity' of the Neanderthals (Pettitt 2011).

Neanderthal burial and the evolution of mortuary practices have been studied by few researchers, including Pascale Binant, Alban Defleur and Paul Pettitt. *La prehistoire de la mort* (1991) by Pascale Binant is a survey of Middle and Upper Palaeolithic burial sites. By describing the sites in terms of common features, such as location and number of individuals, he managed to provide a comparative overview that identified critical subjects and questions relating to these burials. For the Middle Palaeolithic Binant stated that the majority of human bones seems to derive from funerary structures. The burials are concentrated in two regions, Western and Eastern Eurasia. The bones appear to have been processed in various ways, some of which hint at a belief in afterlife. The motives for burying the dead are not detectable and could be as diverse as the burials themselves. However, the diversity itself could reflect a general mental flexibility concerning burial. The Middle Palaeolithic exhibits more uniformity than the Upper Palaeolithic. He concluded that, because of the diversity and originality among Palaeolithic burials, there are no detectable general typical features.

In *Les sépultures moustériennes* (1993) Alban Defleur also described Middle Palaeolithic burial sites of Eurasia and. He noted that several patterns are visible, including the focus on men and infants, a flexed burial position and east-west orientation of the skeletons and association between the dead and structures like pits. He concluded that the traditions could reflect ethnic, regional and local aspects and derive from a cosmology and a desire to facilitate the passage to death, protect the living from the dead and unite social groups. While they did not necessarily have a religious significance,

they could be evidence of a relation with the dead and a concept of the afterlife.

In *The Palaeolithic Origins of Human Burial* (2011) Paul Pettitt described the available data on mortuary behaviour in primates, early hominins, Neanderthals and the first *Homo sapiens* populations. He described how Neanderthal mortuary practices display evidence of variability and, although the quantity of data is low, certain patterns (summarized below) can be recognized . He suggested that among Neanderthals associative interaction with the dead is evident, at least in some places and in some periods.

An eminent critic of Neanderthal burial is Gargett. He claims that the criteria for recognizing Palaeolithic burial are ill-defined and that the arguments in favour of burial, i.e. preservation or the presence of a pit, can also be explained by sedimentology, stratigraphy and taphonomy (Gargett*, et al.* 1989;Gargett 1999;Gargett 2000). Pettitt (2011) suggests Gargett's interpretation is questionable because his research was only literature-based and the underlying logic is flawed. He suggests the following answers to Gargett's five main questions concerning deliberate burial:

What constitutes evidence of purposeful protection of the corpse? According to Gargett, it can only be certain that purposeful burial has occurred if a new stratum can be distinguished over cuttings, pits and depressions that happen to contain Neanderthal remains. The overlying stratum should not be the same as the filling of the pit. Pettitt claims that this is not logical. Firstly, there is no reason to invoke depositions above the grave fill when excavation occurred into existing sediments which were filled with those same sediments. Secondly, in caves with homogenous sediments a grave cutting is not identifiable.

What is the probability of natural burial in caves and rock shelters? Gargett states that Neanderthal skeletons found in caves are the result of cryoclastic depositional environments. He assumes that the individuals were killed while sleeping by rock falls or died naturally. Material may often accumulate

favourably against cave walls or among boulders and be preserved better in this situation. Pettitt suggests that these locations are not necessarily better protected than more central areas, as e.g. stream and carnivores can also reach these spots. In addition, archaeological material does not generally cluster at such locations, while burials have also been found in central places. If Gargett was right, there should be a far higher incidence of relatively complete animal remains against walls.

What is the prior probability of preservation under any circumstances? As described above, Gargett believes that skeletal elements could be better preserved in out-of-the-way places. Skeletons situated in natural features cannot be interpreted as burials. Unless a depression containing Neanderthal fossils can be demonstrated to have been artificially dug for the purpose of burial, well preserved bones in such locations are tautological. However, it is too simplistic to reject burial because of (use of) local natural resources. On the contrary, in funerary caching many Neanderthal corpses could have been deliberately placed in local natural features.

What is the importance of articulation? Gargett claims that the preservation of Neanderthal skeletons in enclosed sites, i.e. caves, simply relates to increased use. The preservation of many Neanderthal remains in relation to earlier hominid fossils, e.g. *Homo erectus*, may simply indicate that Neanderthals spent more time in caves. However, Pettitt notes that the archaeological assemblages from enclosed areas dating before MIS 5 are often rich in both lithics and faunal remains. In addition, Aurignacian, Gravettian, Solutrean and Magdalenian burials are rare or absent in caves, although in these traditions enclosed sites were used more intensively than by Neanderthals.

What is the variability in decomposition rates, disarticulation sequences and the likelihood of disturbance? As there are variable rates of destruction of anatomical elements by disarticulation, disturbance and decomposition, the low number of preserved skeletons of Middle Palaeolithic hominids, indicates the majority succumbed to physical disturbance. Pettitt points that this does not contradict burial. It is a separate issue.

Currently "*most scholars accept that some Neanderthals received deliberate burial after death, and that such burials appear not to have included grave goods or any other form of elaboration visible in the archaeological record*" (Pettitt 2011, 79-80). Until recently, discussion on Neanderthal burial had mostly concentrated on whether or not the Neanderthals buried their dead rather than on details, variability and tradition.

1.4. The question of mortuary space

Although mortuary behaviour among earlier humans is largely non-material and thus not visible in fossil remains, there is one clear indication of mortuary practices in the archaeological record: the placing of the dead in the landscape (Pettitt 2011). From anthropological studies we know that people always think carefully of where they put the remains of their dead. The place of the dead is associated with people's perceived social geographies and is one of the most visible activities through which societies express their relationships to land and their ancestors (Metcalf and Huntington 1979).

The restricted spatial and temporal distribution of burials at certain sites was noted by several researchers (Pettitt 2011;Hovers*, et al.* 1995). If taphonomic explanations can be eliminated, these sites could indicate *mortuary space:* a specific place associated with death and appropriate for burial of the dead, distinguished within the landscape by Neanderthals.

Interestingly, the place of the dead is an opportune research subject concerning Neanderthal mortuary practices. Among the indications of possible deliberate Neanderthal burials is that many burial sites contain more than one individual, they are *multiple burial sites*. Some even contain large amounts of hominid fossil bone, representing dozens of individuals.

1.5. Research setup

This research has been set up to investigate whether Neanderthal distinguish mortuary space. The sub-questions are:

1. How many sites contain remains of multiple individuals?
2. Are sites with multiple individuals rare?
3. Are the inhumations at these sites intentional or accidental?
4. Can we detect a spatial organization of burials at these sites?
5. Are the sites used repeatedly for burials?
6. Do these sites contain indications of transmission (e.g. grave markers)?
7. Are there detectable common patterns or general characteristics (e.g. dominant orientation) in Neanderthal multiple burials?

I will focus on Eemian and Weichselian (MIS 5e-3) sites in Eurasia where remains of more than one Neanderthal individual have been identified. I will use the following definitions:

- *Mortuary space* is defined as a restricted and organized area where multiple burials occurred in a relatively short period of time.
- *Formal burial* is defined as "*The creation of an artificial place for the purposes of containing a corpse. This is at least a three-stage process involving (1) the excavation in the artificial pit or trench intended to serve as a grave (2) the interment of a body within the grave; and (3) the covering of the body with the extracted sediment*" (Pettitt 2011, 9). Because there is no general agreement on what constitutes *deliberate burial*, I adopt an optimistic approach and involve sites with uncertain funerary nature. I assume that deliberate burial consists of the three-stage process described above and that it involves a relatively complete, well-articulated and preserved skeleton and a burial structure.
- *Multiple burial* in this context is defined as more than one (possible) deliberate burial in a restricted area. Multiple burial is more

convincing when the number of buried individuals is high and there is some association between the skeletons.

Chapter 2 describes the research methods. Chapter 3 contains an overview of Neanderthal fossil sites: an exhaustive database of all relevant sites, concluding with the selection of strong candidates for mortuary space. Chapter 4 deals with the case analyses: analytical description of relevant features and relationships in the strong candidates for mortuary space. Chapter 5 interprets the results of the analyses. Chapter 6 discusses the implication and limitations of the research, while chapter 7 present my main conclusions.

2. Methods

Existing information on possible Neanderthal burials is available in several publications, both overviews and site documentation. However, no overview exists from the specific viewpoint of the study of mortuary space traditions. Consequently, the first step in the research was to collect and organize such information. General descriptions of twenty-nine relevant sites, i.e. sites were Neanderthal fossil have been found, which date to 130.000-11.500 BP (both assumed burials an not-burials), were collected from the following sources: (Schwartz*, et al.* 2001;Schwartz*, et al.* 2003;Pettitt 2011;Defleur 1993;Binant 1991).

The sites were organized in a computerized database. This allowed a compact itemized description with respect to aspects and issues concerning mortuary space traditions. Features included in this database were:

1. Site name
2. Site location type (i.e. cave site, shelter or open-air site)
3. Dating range
4. Neanderthal burial cluster
5. Number of individuals (minimum in literature)
6. Possible burial

From the above collection, a selection was made of five strong candidates for mortuary spaces. The five selected sites were La Ferrassie, La Quina, Krapina, Amud and Shanidar. The criteria for this selection included:

- High number of individuals: higher than five
- Existing interpretations of mortuary behaviour on these sites
- Adequate accessible documentation

An analytical description of the selected sites was made, focussing on the presence of multiple burial, dating and temporal restriction, and spatial organization. The following information was collected for each site.

- General information about the research history, location and type of the site.
- The dating range of the site, including the site use duration and the dating of the human fossils remains.
- The context of the site. Firstly, this part of the description focussed on the stratigraphy of the site, including the layers containing human remains and the presence of burial pits. Secondly, the location of human remains was analysed, i.e. natural features or artificial burial features serving as protecting structures. Thirdly, if focussed on the presence of non-human remains: flint, fire traces, faunal and floral remains. The information could serve as arguments for temporal restriction at a site.
- Human remains, including the estimated number of individuals, completeness, preservation and articulation, the identification, i.e. age at death and sex, and deliberate treatment of the body, reflected in anatomical position and processing of the bones.
- Discussion of literature: a brief review of interpretations relevant to mortuary behaviour
- Mortuary space interpretation: a brief review of interpretation relevant specifically to mortuary space

3. Overview of Neanderthal fossil sites

The starting point of the research is an overview of twenty-nine Neanderthal fossil sites, dating from the Eemian and Weichselian, and of the number of individuals found there (Table 1).

Table 1 Overview Neanderthal fossil sites based on Schwartz *et al.* (2003, 2001)

Site name	MNI	Cluster	Dating range	Notes
Hortus	4	West	middle Würm II	
La Chapelle-aux-Saints	1	West	47 - 56 ka	
La Ferrassie	7	West	70 ka	
La Quina	27	West	43-49 ka	
Le Moustier	2	West	40 ka	
Pech de l'Azé	1	West	45 - 55 ka	
Régourdou	2	West	last glacial	
Roc de Marsal	1	West	Würm II, 50 ka	
Saint-Césaire	1	West	36,5 ka	
Archi	1	None	Upper Pleistocene	
Engis	4	None	Late Pleistocene or Aurignacian	
Figueira Brava	1	None	30 ka	Only 1 tooth and 1 phalanx.
Gibraltar: Devil's Tower	1	None	50 ka	
Gibraltar: Forbes Quarry	1	None	Uknown	
Guattari	3	None	50 - 74 ka	
Krapina	30	None	130 ka	More mortuary symbolism than burial.
Neanderthal	1	None	40 ka	Possibly more individuals
Saccopastore	2	None	130 - 120 ka	
Sakajia	1	None	Late Pleistocene	Only one partial maxilla.
Sclandina	1	None	127 ka	Only some dental remain.
Spy	3	None	early part last glacial	
Subalyuk	2	None	70 -60 ka	
Vindija	1	None	29 - 28 ka	Possibly more individuals.
Zafarraya	1	None	27 35 ka	
Amud	7	East	40 - 60 ka	
Kebara	1	East	60 ka	Possibly more individuals.
Shanidar	9	East	50 - 80 ka	
Tabun	2	East	122 ka	Possibly more individuals.
Teshik-Tash	1	East	Early Würm	

This overview shows that sites where more than one Neanderthal individual has been found are not rare. Of the twenty-nine reliable Neanderthal fossil sites, thirteen contain a minimum number of individuals that is higher than one. Furthermore, at several sites (Neanderthal, Vindija, Kebara and Tabun) here is a possibility of a higher number of individuals, which is still under consideration. Secondly, several of the sites (Figueira Brava, Sakajia and Sclandina) with only one individual contain very few skeletal remains. It is possible that at these sites more individuals were originally present but their remains have not been preserved. It is therefore probable that the number of sites with several individuals is larger than thirteen.

We can correlate the minimum number of Neanderthal individuals with whether the site is part of either the Western or Eastern Eurasian burial cluster. The table below (Table 2) shows that the sites containing more than one individual occur more often in than outside the burial clusters. However, as it is a minimal difference and the sample is small, it is not significant.

Table 2 Relationship MNI and clusters in general

	Cluster	No cluster	Total	%
MNI = 1	7	9	16	55.2%
MNI > 1	7	6	13	44.8%
Total	14	15	29	100%
%	48.3%	51.7%	100%	

The next table (Table 3) shows differences in the number of individuals between sites in the West Eurasian burial cluster and the East Eurasian burial cluster. In general, there are more sites in the West Eurasian burial cluster area. However, the difference between sites in the West and East Eurasian burial cluster containing more than one individual in this sample is too small to be significant.

Table 3 Relationship MNI and specific clusters

	West Eurasian cluster	East Eurasian cluster	Total	%
MNI = 1	5	2	7	50.0%
MNI > 1	4	3	7	50.0%
Total	9	5	14	100%
%	64.3%	35.7%	100%	

The dating ranges of the site show that the sites are relatively young. Only three sites are older than 80.000 BP. Older sites appear to contain higher numbers of individuals. This suggests that the preservation of the skeletal remains does not simply relate to site age.

From this overview, five candidates for mortuary spaces emerge, based on their number of individuals (higher than five)(Figure 2), adequate accessible documentation, and existing interpretations of mortuary behaviour on these sites: La Ferrasie, La Quina, Krapina, Amud and Shanidar.

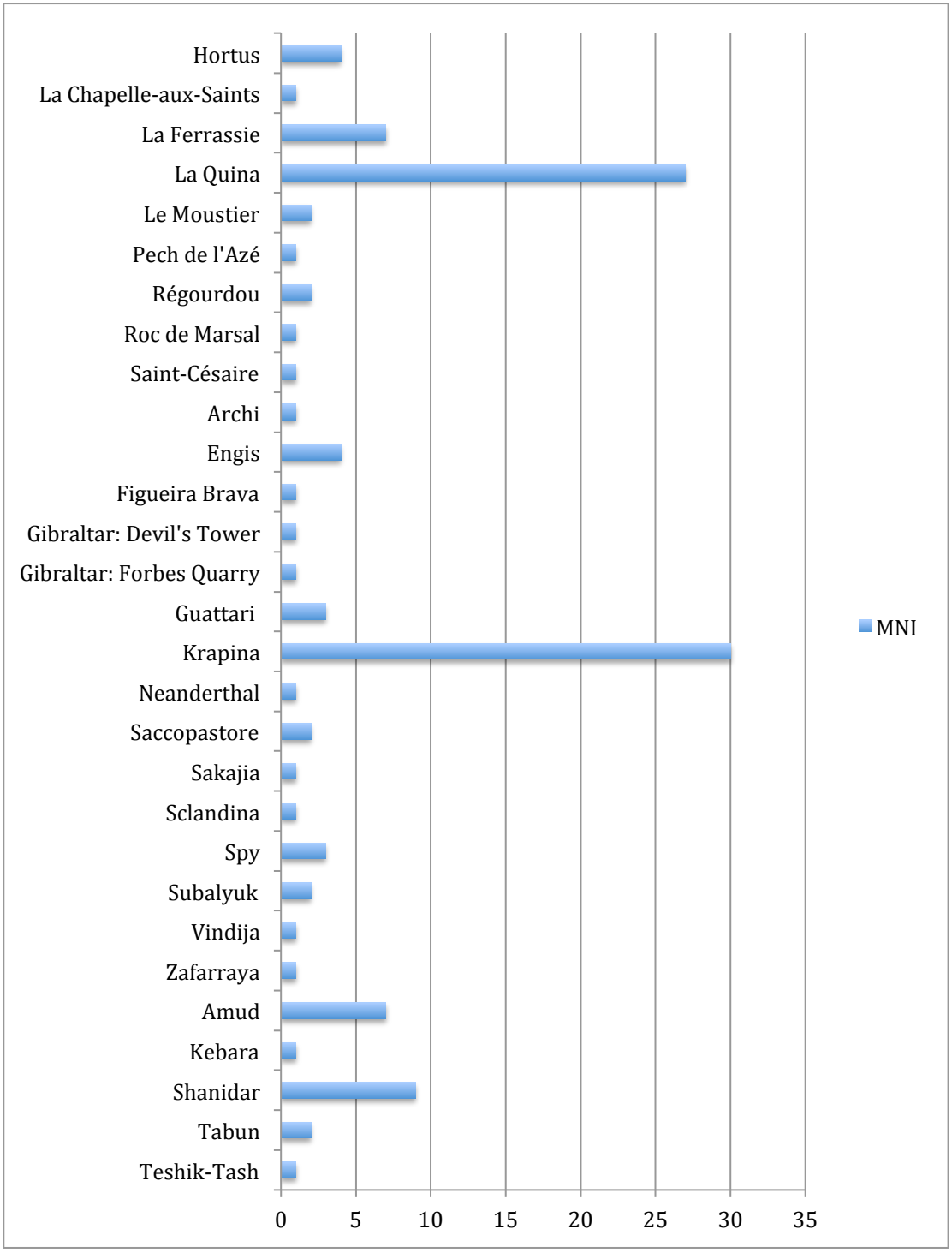

Figure 2 Neanderthal fossil site and the selection of possible mortuary spaces

4. Description of the sites

4.1. Introduction

This chapter contains the analytical description of the five strong candidates of the research: Le Ferrassie, La Quina (France), Krapina (Central East), Amud and Shanidar (Near East)(Figure 3).

Figure 3 Eurasian map with described sites

4.2. La Ferrassie

4.2.1. Introduction

La Ferrassie is a rock shelter site in the Dordogne, France, and is part of West Eurasian Neanderthal burial cluster. The first excavations were done by D. Peyrony and L. Capitan in 1909 (Schwartz, *et al.* 2001).

Although they were found in the Mousterian level, which is 70.000 years old (Mellars 1996), the human remains are considered to be younger (Schwartz, *et al.* 2001). Chronostratigraphically, the site could be dated to 60 – 75.000 BP (Pettitt 2011).

The rock shelter displays a stratigraphy of 7 to 22 metres. It comprises thirteen layers (A-N), including occupation levels from the Acheulean to the Gravettian. All human remains derive from layer C and D, both Mousterian, which exist across the entire excavated area (Schwartz, *et al.* 2001;Defleur 1993).

At La Ferrassie at least seven individuals have been found: LF 1, LF 2, LF 4b, LF 5, LF 6 and LF 8, plus LF 3 and LF 7 that now believed to be the same individual (Schwartz, *et al.* 2001). Another individual, LF 4, turned out to belong to another Neanderthal site, Le Moustier (Maureille 2002). All individuals are quite complete and most of their parts are well preserved and articulated.

LF 1 consists of the cranium, the mandibula, twenty three vertebrae, the sacrum, twenty costae, two claviculae, two scapulae, two humeri, two radii, two ulnae, the pelvis, two femora, two tibae, two fibulae, two ossa mani and two ossa pedis, i.e. the skull, the trunk and the upper and lower limbs – a fairly complete skeleton. In addition, the bones are well preserved and articulated. The individual was identified as an adult male of forty to fifty years old. He was lying on his back, with the trunk slightly tilted to the left. The head was turned toward the left, with the jaw wide open. The pelvis was half-inflected, the knees turned to the right. The upper left limb lay along the

body with the left hand at the hip. The right hand was at the shoulder level. The legs were folded under the thighs (Defleur 1993).

LF 2 consists of calvaria temporale, condyles occipitalis, the maxilla, dental remains, eleven vertebrae, nineteen costae, two scapulae, two humeri, one radius, one ulna, the pelvis, two femora, two patella, two tibiae two fibulae, two ossa mani and two ossa pedis, i.e. some cranial bones, dental remains, the trunk, one upper limbs ad the lower limbs, including hand and feet bones – as with LF 1, a fairly complete skeleton. In addition, the inferior skeleton was well preserved and articulated (Defleur 1993). The skull was very fragmented. The individual was identified as a female adult of twenty five to thirty years old. Her legs were folded under the thighs, which were flexed under the pelvis. The upper limbs were also folded, resting on the knees. She was lying on her right side at the same level and in the same axis as the first skeleton but in a reverse position. The heads were head to head, only 0.5 metres apart (Defleur 1993).

LF 3 and LF 7 consist of calvaria, sphenoidale, three ossicula auditus, two radii, two ulnae, ossa mani, ossa pedis and one talus, i.e. skull bones, parts of the upper limbs and hand and feet bones – a partially complete skeleton. Some small, fragile elements have been preserved. The individual was identified as an ten-year-old child (Defleur 1993).

LF 4b consists of cranial fragment, seven vertebrae, twenty one costae, one clavicula, one scapula, two humeri, one radius, one ulna, the pelvis, two femorae, two tibae and two fibulae, i.e. cranial fragmens, parts of the trunk, parts of the upper limbs and the lower limbs. The skeleton is quite complete and was well preserved. The individual was identified to be a neonate (Defleur 1993).

LF 5 consists of cranial fragments, two humeri, two femora, two tibae: cranial fragments and the lower limbs. The skeleton was only partially preserved and belonged to a foetus (Defleur 1993).

LF 6 consists of sixteen to twenty vertebrae, vertebra sacralis, eleven costae, two humeri, two radii, two ulnae, ossa mani, the pelvis, two femora, two tibae, one patella, one fibula and ossa pedis, i.e. the trunk and the upper and lower limbs, including hand and feet bones. The skeleton was partially complete and partly well preserved. The bones were well articulated, with the lower limbs folded. The individual was identified to be a three-year-old infant (Defleur 1993).

LF 8 consists of the cranium, twelve vertebrae, costae, the pelvis and ossa mani: the cranium, parts of the trunk and hand bones. The skeleton was partially preserved and the bones were articulated. The individual was identified as a two-year-old infant (Defleur 1993).

The human remains can be divided in four spatial groups (Figure 4). The first group, LF 1 and LF 2, was situated close to the rear wall of the shelter at the west corner of the shelter. The skeletons lay head to head at a distance of 0.5 meters and were placed in the same position, only in reverse. LF 1 was situated in a burial pit. Additionally, LF 1 was associated with three large stone slabs: one of the stones lay underneath the head and the other two were on either side of its torso. Under the remains of LF 1 a bone was found with parallel incisions (Pettitt 2011;Defleur 1993).

The second group, LF 3, LF 7 (which are one individual) and LF 4b, was situated in a more central position in the cave. Both skeletons were placed in two parallel, almost identical elongated oval graves of 0.7 by 0.3 metres, oriented east-to-west. The depressions were artificially made and filled with stony rubble (Pettitt 2011;Defleur 1993). In addition, 3 metres away from this cluster two other pits were found, also oriented east-to-west. Both contained no human bones but were filled with faunal remains and flint tools, some exquisitely made. In the second pit, that of LF 4b, two flat stones were found (Defleur 1993).

The third group, LF 5 and LF 8, was situated close to the rear wall and at the edge of a group of possible sediment mounds near nine depressions. LF 5

was placed in a smaller oval depression of 0.4 by 0.3 metres. Three flint scrapers were found in the pit. LF 8 was placed in a roughly rectangular depression. The remains were found in an overall rectangular space near the shelter's wall. The skeleton was oriented east-to-west (Pettitt 2011;Defleur 1993).

Finally, LF 6 was situated in a central position in one of several bowl-shaped pits. The skeleton was placed in the context of six bowl-shaped depressions. The depression in which the human remains were found, was subtriangular in shape and measuring 1.4 by 0.3 metres. It also contained three well-made Mousterian tools, two scrapers and one point. The depression was covered by limestone blocks, which were artificially produced. This skeleton too was oriented east-to-west (Pettitt 2011;Defleur 1993).

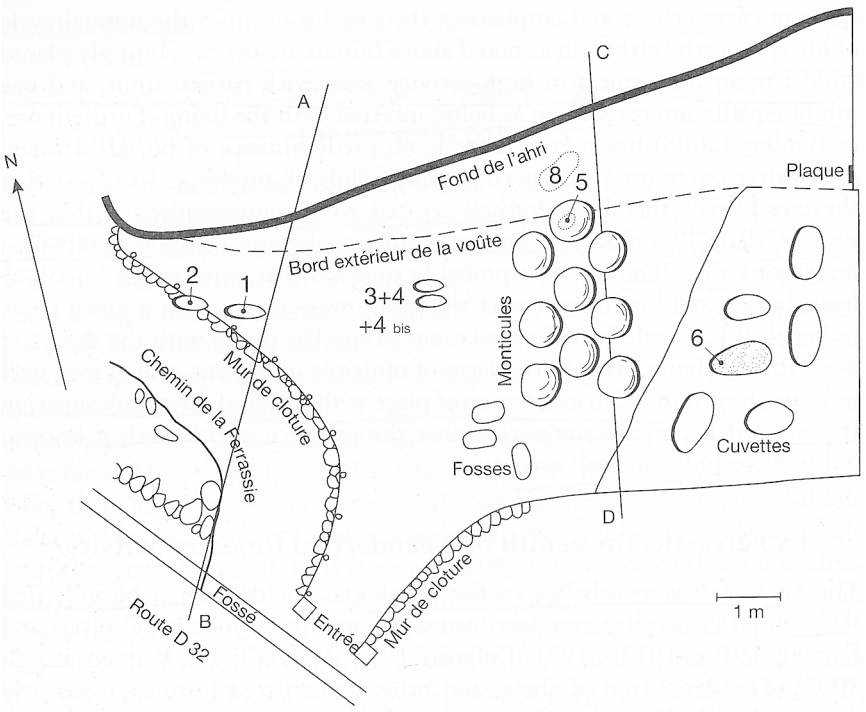

Figure 4 La Ferrassie spatial organization (Pettitt 2011)

4.2.2. Discussion

Most scholars interpret the skeletons at La Ferrassie as intentional burials. The arguments by Defleur (1993) and Pettitt (2011) can be summarized as follows:

- LF 1 was interpreted as a burial, firstly, because of its completeness, preservation and articulation. Secondly, the skeleton lay in a pit. Thirdly, the anatomical position of the skeleton suggests that he was placed deliberately in this posture. Fourthly, the human remains were associated with three large stones. Lastly, the proximity of LF 1 and LF 2 seems intentional.
- In the case of LF 2 the arguments were, firstly, her completeness, preservation and articulation, and, secondly, her proximity to LF 1.
- LF 3 and LF 4 share the same characteristics: preservation, location in a pit and proximity to each other.
- LF 5 was interpreted as a burial because of its preservation and location in a clear grave cutting.
- Similarly, LF 6 is characterized by preservation, articulation and location in a depression covered by stones that arguably marked the burial.
- In the case of LF 8 the single argument is its placement in a clear grave cutting.

4.2.3. Mortuary Space

La Ferrassie is considered a multiple burial site, sometimes even part of a cemetery complex (Schwartz*, et al.* 2001). The individuals are associated spatially and the burials display patterns, including pairwise association and east-to-west orientation. Pettitt (2011) identifies an additional spatial characteristic: adult burials are on the western part of the site and infants and foeti in the centre and the east. This indicates intentional planning of a site of multiple burials.

4.3. La Quina

4.3.1. Introduction

The site of La Quina, located in a rock shelter complex in Charente, France, was discovered in 1872. Numerous hominid finds were discovered from 1908 until 1965, mainly by the first excavator, Henri Martin (Schwartz*, et al.* 2001). The site is a part of the West Eurasian cluster of Neanderthal burials.

Bed 1 to 4, the beds in which the human fossils are situated, are dated by radiocarbon to 35.200 BP (Schwartz*, et al.* 2001) and through faunal remains to 60.000-70.000 BP (Mellars 1996). Thermoluminescence dates the site at 43.000 ±3.600 to 48.750 ±6.000 BP (Defleur 1993). Chronostratigraphy dates the site to 55.000-65.000 BP (Pettitt 2011).

Many fragmented bones, an adult mandible (H9), a child's skull (H18) and one fairly complete adult skeleton (H5) were found at La Quina. They represent at least twenty to twenty seven individuals (Schwartz*, et al.* 2001;Pettitt 2011;Martin 1923).

The human skeletons were mostly fragmented and incomplete. However, Martin noted that the human remains did not contain any marks of damage by animals. One skeleton, H5, was fairly complete, well preserved and articulated (Pettitt 2011;Martin 1923;Defleur 1993;Binant 1991).

The anatomical position of H5 was described in detail: "*Le squelette était placé horizontalement; la tête couchée sur le côte droit regardait la vallée; elle était en amon, et les fragments de membres en aval*" (Martin 1923, 30).

At La Quina several processed and used bones were found (Martin 1923). Among these are the earliest known tools with human bone (more specifically cranial fragments) as a raw material by another species than Anatomically Modern Humans. One possibility is that the producer of the tool was not aware of the bone being human. Another explanation is that the human skull was processed ritually for consumption or symbolic purpose. In

this case, the individual who knapped the bone was aware of it being human (Verna and d'Errico 2011).

All human remains came from the Mousterian deposits (called bed 1-4 by Martin (1923)) of the upper shelter (Schwartz*, et al.* 2001;Mellars 1996). However, the exact stratigraphy of the upper shelter is yet unclear (Schwartz*, et al.* 2001). The sequence of stratigraphic layers appears to represent several occupations. The inferior stratigraphic layers seem to contain a more primitive flint industry. The stratigraphic layer, from the inferior until the superior, show a true technological process (Martin 1923;Defleur 1993). According to Martin, after several phases of reoccupations landslides caused erosion on the cliffs. The habitat of the La Quina-Neanderthal changed, forcing them to leave the location (Martin 1923).

Some human remains were found in a particular context. Firstly, H5 was found in the context of a high number of flint (Martin 1923). In addition, according to Martin (1923) at the time of inhumation of the skeleton, the water would have reached above the level of H5. However, according to Defleur (1993), the frequency of limestone suggests no alluvial or colluvial origin of the deposition. Secondly, an irregular subcircular pit (80 x 70 cm) has been identified at La Quina, with two human teeth found in its periphery (Pettitt 2011).

4.3.2. Discussion

Despite the completeness and preservation of H5, the possible presence of a pit and a context rich in flint, Henri Martin did not interpret H5 as an intentional burial. He considered that burying an individual in underwater mud would have been impossible. He did acknowledge Neanderthal burial at other sites but in his view the corpses at La Quina were simply abandoned, which could not reflect honouring of the dead. According to Martin (1923) three scenarios could have caused the presence of the corpse of this water location.

- The person could have fallen of the top of the cliffs
- The corpse could have sunk post-mortem to its current location
- The corpse could come originally from an upstream pointed and floated to its current location

However, according to Defleur (1993), the frequency of limestone suggests no alluvial or colluvial origin of the deposition(Defleur 1993). In addition, the skeleton was found in a context of a high number of flint. Although Martin interpreted their presence as accidental, he noted their rare quality. Both Binant (1991) and Delfeur (1993) hint at the ritual significance of the amount of flint in the context of the skeleton.

The pit with the two human teeth on its periphery could suggest a funerary function. However, there is not sufficient evidence for an intentional human burial (Pettitt 2011)

4.3.3. Mortuary space

Binant (1991), Defleur (1993) and Pettitt (2011) all interpret the skeleton of H5 as an intentional burial. In addition, they consider the site La Quina in general as a place of intentional burials. This is mostly based on the preservation and anatomical association of the human remains.

4.4. Amud

4.4.1. Introduction

The site of Amud is situated in a limestone cave on the high wall of the present stream Wadi Amud in Israel (Pettitt 2011;Defleur 1993). The first skeleton was discovered by H. Suzuki and colleagues in 1961 (Schwartz, *et al.* 2003;Rak, *et al.* 1994). The site is part of the Neanderthal burial concentration of Eastern Eurasia (Defleur 1993).

Level bed B, containing the upper concentration of human remains, was dated by electron spin resonance dating techniques to 42.000-49.000 BP (Grün, *et al.* 1991). Thermo luminescence determined the age of the lower

stratigraphic units, which contain the lower concentration of human remains to 50.000-60.000 BP (Rak*, et al.* 1994).

At least sixteen individuals can be distinguished from the many hominid remains found at the Amud cave (Suzuki and Takai 1970), although other descriptions include eighteen different individuals (Hovers*, et al.* 1995). Figure 5 provides and overview based on determination by Hovers et al. (1995).

Most of the human bones are very fragmented, but several individuals are partially complete, thus distinguishable and were therefore repeatedly discussed in literature (Suzuki and Takai 1970;Schwartz*, et al.* 2003;Pettitt 2011;Hovers*, et al.* 1995;Hovers*, et al.* 2000;Gargett 1999;Gargett 2000;Defleur 1993;Binant 1991):

- Amud 1, a complete but poorly preserved (although not damaged) skeleton on an adult
- Amud 2, consisting of an adult maxilla
- Amud 7, a fragmented and complete articulated skeleton of an infant of approximately ten months old, containing some skeletal elements that are seldom preserved
- Amud 9, consisting of the left foot, tibia and fibula

Among the human remains the frequency of immature individuals is high (Schwartz*, et al.* 2003;Hovers*, et al.* 1995). Hovers et al (1995) indicate that only six of the possible eighteen individuals are adults. However, of the more complete skeletons (Amud 1, Amud 2, Amud 7 and Amud 9) all but one are adults. The sex of most individuals is generally not known. For the subadults this is hardly surprising, as traits indicating sex are not yet apparent in children.

HOMINID NO.	INDIVIDUAL AGE	BODY PARTS	CONTEXT	UNIT	SQUARE	DEPTH***	YEAR
Amud I^	adult	complete skeleton	MP	B1/6	G6/H6-7	130	1961
Amud II^	adult	right maxilla	MP	B2/8	O8b	380	1961
Amud III^	4-year old infant	right temporal, fragment of maxilla, lower right deciduous second molar, frontal bone (?)	probably MP	B2/8	O7b-d	370	1961
Amud IV^	3-year old infant	right temporal bone	MP	B4	N5b	460	1961
Amud 5	6-9 months*	humerus, tibia, radius	MP	B1/6-B2/7	L3a	235-255	1991
Amud 6	neonate*	complete skeleton	Intrusive		N/0 12/13	370	1991
Amud 7	10 months**	partial skeleton	MP	B2/8	K3a	270	1992
Amud 8	8 years**	upper right deciduous molar	MP	B1/6	J3d	199	1992
Amud 9	adult	left foot, tibia, fibula	MP	B2/8	O2c	338-345	1993
Amud 10	infant*	radius	MP	B2/10	M4c	375-385	1993
Amud 11	7 years**	upper deciduous canine, very worn	MP	B2/7	J4a	250-255	1993
Amud 12	infant*	distal part of radius	MP	B2/10	M3b	338	1993
Amud 13	adult**	worn molar	MP	B2/10	M3c	342-350	1993
Amud 14	adult	frontal process of a left zygomatic bone	disturbed		L3c	230-235	1991
Amud 15	infant*	radius	disturbed		I3d	189-194	1992
Amud 16	18 months*	femur	MP	B1/6	I3d	203-209	1992
Amud 17	adult**	worn upper pre-molar, molar	MP	B2/8	P2b-c	354-365	1994
Amud 18	infant*	humerus	MP	B2/8	O2b	366	1994

@ – The hominid inventory is based on a MAXIMUM number of individuals, i.e., several bones were considered to belong to one individual only when there was no doubt about their association. Where such association was not confirmed, specimens were numbered as belonging to separate individuals.
^ – description and age determination – after Sakura, 1970;
MP – Middle Paleolithic;
* – tentative age estimate, based on size comparison with modern human infants;
** – age estimate based on dental age of modern humans, and degree of wear;
*** – Depth below datum of the recent excavation. This datum is 70 cm lower than the one used by the previous team.

Figure 5 Overview of human remains from Amud Cave (Hovers, *et al.* 1995)

Observations of the position of the skeleton were possible on the two most complete ones. Amud 1 was placed horizontally on its left side, in a contracted position with its members flexed. Amud 7 was placed on its right side. Amud 1 and Amud 7 were both oriented in the same direction, with their head pointing to the northwest (Pettitt 2011;Hovers, *et al.* 1995;Defleur 1993).

The remains were concentrated in the northwest part of the cave, close to the cave's wall (area A on Figure 6). Amud 1 was found in the cave's centre the drip line of the cave, a place that must have been subjected to frequent animal and hominin use. Amud 7 was found in a small niche against the cave's wall. The skeleton was placed on top of a bedrock in a small niche against the cave's wall, with a maxilla of red deer contacting the pelvis (Pettitt 2011).

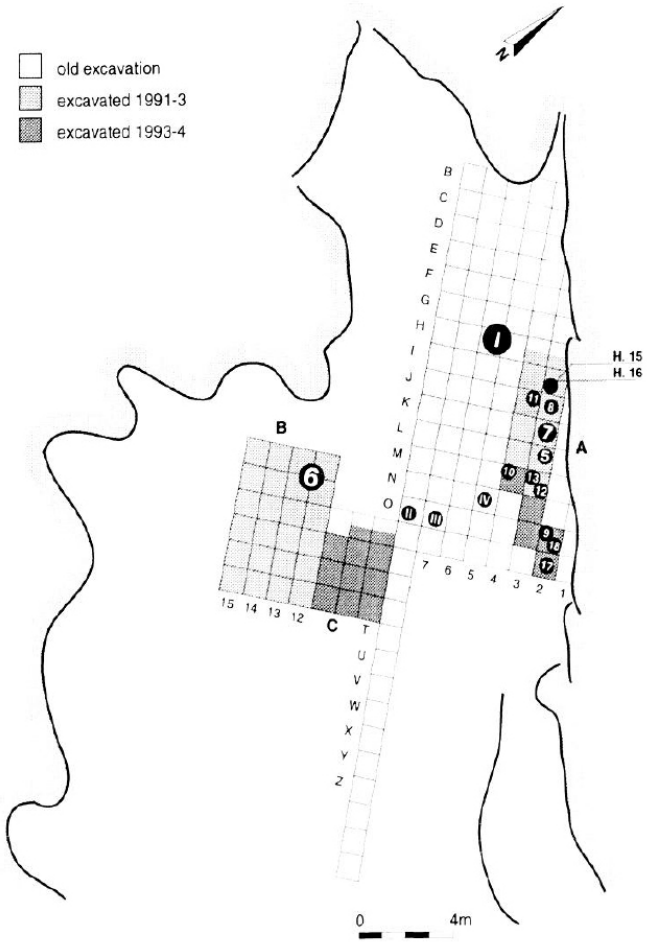

Figure 6 Maps of distribution human remains at Amud (Hovers, *et al.* 1995)

All Middle Palaeolithic human remains come from the natural formation B, which can be subdivided into four stratigraphic levels: B1 to B4. Within these at least two concentrations of human remains associated with concentrations of Palaeolithic flint (Rak, *et al.* 1994).

4.4.2. Discussion

Several skeletons from Amud have been generally considered as intentional Neanderthal burials (Schwartz, *et al.* 2003;Pettitt 2011;Hovers, *et al.* 1995;Defleur 1993). These interpretations are mostly based on their completeness and their preserved articulation. By contrast, faunal remains in its context were highly fragmented. The fragmentation of the other human skeletons could have been caused by rock falls (Pettitt 2011). In addition,

some positions (e.g. the flexed position of Amud 7) may indicate deliberate burial (Suzuki and Takai 1970).

The articulation of Amud 1 is surprising, as it is located in the centre of the cave under the drip line. Completeness and lack of disturbance suggest the person may have been deliberately buried there (Pettitt 2011). This is reinforced by the extremely flexed position of the skeleton. However, no burial architecture of grave goods were found in the context of the skeleton (Hovers, *et al.* 1995).

Amud 7, although only partially complete, contains some rare skeletal elements (phalanxes) in anatomical association. The pattern of preservation and the lack of gnawing marks on the bones suggest that the corpse was not exposed to animals. The natural niche in which the skeleton was found could have served as a burial structure (Hovers, *et al.* 1995). Deliberate burial is further supported by the red deer jaw (Schwartz, *et al.* 2001;Rak, *et al.* 1994) The addition of a maxilla as a grave good is similar to modern human burials of Skhull V and Qafzeh (Hovers, *et al.* 1995). This could be the first occurrence of possible grave goods in Neanderthal burials in the Levant (Rak, *et al.* 1994). However, many researchers are not convinced that the maxilla is a grave offering (Pettitt 2011;Gargett 2000).

The common orientation of Amud 1 and Amud 7 could indicate a pattern in Amud mortuary practices, although it is different to the dominant east-western orientation in other possible Neanderthal burials (Hovers, *et al.* 1995;Defleur 1993).

Although the skeleton of Amud 9 is not complete, it is also commonly interpreted as an intentional burial. The bones are well articulated and lay under 10 cm of sediment, which separated it from the fallen blocks of a collapsed rock. This suggests that death and burial of the Amud 9 were not caused by rock falls (Pettitt 2011;Hovers, *et al.* 1995).

According to Hovers *et al*. (1995), a not-articulated skeleton does not refute intentional burial. Recent taphonomic analysis has shown that Levantine

cave sites were subjected to severe biological and mechanical disturbances that may have disturbed the remains.

Not all researchers agree with the status of the Amud skeletons as possible burials. According to Gargett, Neanderthal skeletons may often be the result of rock falls or natural deaths while sleeping. In addition, he suggests that materials may often accumulate favourably against cave walls or among boulders (Hovers, *et al.* 2000).

4.4.3. Mortuary space

Hovers et al. (1995) note a spatio-temporal distribution of the Neanderthal remains at Amud. The remains are mostly restricted to certain layers (B1 and B2) and a certain area (Area A). This could have been caused by three factors. The first is differences in the preservation of bones in different times and areas within the cave. However, this was refuted by micromorphological analysis of the cave. The second is bias in retrieval methods: for example wet-sieving was not applied to all areas of the cave. However, this too is probably not the case, since most bones were recovered through excavations in Area A. Similar excavations in Area B and Area C did not result in the same frequency of bones. The third is that distribution of human remains at Amud represents the result of intentional hominid behaviour. This could be the most plausible explanation of the repetitive choice for deposition of human carcasses, implying the existence of a mortuary space tradition. The cave occupants would have allocated a certain space for the specific purpose of depositing or burying the dead. A dumping zone is also possible, although there is no suggestion of that in analyses of faunal remains. The possible grave offerings also support the explanation of a mortuary space (Hovers, *et al.* 1995).

4.5. Shanidar

4.5.1. Introduction

The cave site Shanidar is located in the Great Zab river valley, in the Zagros mountains of northern Iraq. The site was excavated first by R. Solecki in

1953. The site is part of the East Eurasian cluster of Neanderthal burial sites (Schwartz*, et al.* 2003).

Originally, the first three skeletons found at Shanidar were dated to 46.000-64.000 BP. As the lower fossils were found in a slightly lower stratigraphic position, he suggested that their deposition spanned only a few hundred years (Solecki 1959). More recent radiocarbon dates from the top of the layer containing hominid remains (Shanidar I, III and V) indicate a date of at least 50.000 BP. The lower hominid remains (Shanidar II, IV, VI, VII, VIII and IX) date from 60.000 a and 70.000-80.000 BP (Schwartz*, et al.* 2003).

According to Defleur (1993), two phases of human remains inhumation are apparent, corresponding to the radiocarbon dates of 46.900 ± 1500 and 50.600 ± 3000 BP. Pettitt (2011) suggests that the burial practices in Shanidar occurred during a period spanning perhaps as little as 10.000-20.000 years or less.

At Shanidar nine complete and partial individuals have been found (Solecki 1959;Solecki 1971;Solecki 1972;Schwartz*, et al.* 2003;Defleur 1993):

Shanidar I consists of an fairly complete skeleton, comprising of both the cranium and post-cranial remain: the mandibula, vertebrae, costae, a sacrum, two clavicular, two scapulae, two humeri, one radius, one ulna, ossa mani, ossa coxae, one femur, two tibiae, two fibulae and ossa pedis, i.e. the skull, the trunk and of parts of the upper and lower limbs, including hand bones. Although fragmentary (probably due to rock fall), the cranium was well preserved and all bones were present. The mandible had moved from its original position. The skull and postcranial skeleton were isolated from each other due to the rock fall. The skeleton was identified as a male adult of thirty to forty years old (Solecki 1959;Schwartz*, et al.* 2003;Defleur 1993). The skeleton was extended on his back. The left shoulder was placed higher than the right one. The left and right humeri lay parallel with the body, the left forearm and hand transverse on the chest. The right hand and forearm were missing. The legs were flexed. Trinkaus (1983) suggested that the skeleton

had undergone artificial cranial deformations(Trinkaus 1983). However, Schwartz et al. (2003) consider this unlikely(Schwartz*, et al.* 2003).

Shanidar II consists of the cranium, the mandibula, vertebrae, two scapulae, one tibia and a fibula: the skull, parts of the trunk and few lower limb bones. The skull, although very fragmented, was relatively complete and well preserved in comparison to the postcranial skeleton. The skeleton was identified as an adult male of twenty to thirty years old (Solecki 1959;Schwartz*, et al.* 2003;Defleur 1993).

Shanidar III consists of dental remains, five lumbar vertebrae, the sacrum, costae, two claviculae, two scapulae, two humeri, two ulnae, one radius, ossa mani, ossa coxae, two tibiae, two fibulae and ossa pedis: dental remains, parts of the trunk and parts of the upper and lower limbs, including hand and feet bones. Especially the vertebrae and the foot bones were well articulated. Although animal activity may account for some missing bones, the bones found are not damaged by e.g. gnawing or chewing. The skeleton was identified as and adult male of forty years old. The skeleton lay on his right side, orientated east-to-west, with the head to the east. The right hand was on the left forearm and the left hand was at the level of the head. A blade was stuck between two of his rib bones and there had been some healing of the bone. The legs were flexed against the trunk (Solecki 1959;Schwartz*, et al.* 2003;Defleur 1993).

Shanidar IV consists of the cranium, a mandibula, vertebrae, the sacrum, costae, two scapulae, two humeri, two ulnae, two radii, ossa mani, ossa coxae, two femora, one patella, two tibiae, two fibulae and ossa pedis, i.e. the skull, parts of the trunk and the upper and lower limbs, including hand and feet bones. The person was identified to be an adult male of thirty years old. The skeleton was lying on his left side, facing west, with his head towards the south (Solecki 1959;Schwartz*, et al.* 2003;Defleur 1993).

Shanidar V consists of the cranium, vertebrae, costae, two scapulae, two ulnae, one radius, ossa mani, ossa coxae, two femora, two patellae, one tibia

and one fibula: the cranium, parts of the trunk and parts of the upper and lower limbs, including hand and feet bones. The skeleton was initially articulated but later disturbed by inhabitants of the cave. The person was a male adult, older than forty years old. He originally lay in a contracted position, with his legs folded under the trunk and one hand on the knees (Solecki 1959;Schwartz*, et al.* 2003;Defleur 1993).

Shanidar VI consists of the cranium with dental remains, two humeri, two ulnae, two radii, ossa mani, ossa coxae, two femora, one patella, two tibiae, two fibulae and ossa pedis, i.e. the cranium, dental remains and the upper and lower limbs, including hand and feet bones. The skeleton lay in a flexed or curved position, with the head pointing to the north. The head was facing upwards. The arms were flexed and also to the right. The legs and feet were at the right side, to the west. The bones were not found articulated. The person was identified as a female adult (Solecki 1959;Schwartz*, et al.* 2003;Defleur 1993). As with Shanidar I, Trinkaus (1983) suggested that the skeleton had undergone artificial cranial deformations. However, Schwartz et al. (2003) consider this unlikely.

Shanidar VII consists of the cranium with dental remains, vertebrae, costae, ulna, ossa mani, femur, tibia ossa pedis, i.e. the cranium with dental remains, parts of the trunk and part of the upper and lower limbs, including the hand and feet bones. The skeleton lay in a flexed or curved position, the head pointing to the north and all bones were articulated, although badly preserved. The legs and feet were at the right side, to the west. The arms were flexed and also to the right. The head was facing upwards. The person was identified as an infant of nine months old (Solecki 1959;Defleur 1993).

Shanidar VIII consists of a cranium, two humeri, one radius, ossa mani, one fibula and ossa pedis: the cranium and parts of the upper and lower limbs, including hand and feet bones. The bones were not found articulated. The person was identified as a female adult (Solecki 1959;Defleur 1993).

Shanidar IX consists only of vertebrae belonging to an infant (Solecki 1959;Defleur 1993).

Shanidar has a sequenced stratigraphy, with a depth of 14 metres, and is characterized by repeated rock fall. Four layers can be distinguished. Layers A to C contain Upper Palaeolithic to modern archaeology. Layer D contains remains of the Middle Palaeolithic and is situated at a depth of 8.5 metres, just above a rocky substratum. The deposits consist almost entirely of layer C and D, both Palaeolithic strata (Schwartz*, et al.* 2003;Defleur 1993). The stratigraphy of Shanidar reveals a succession of occupations, which were from time to time shattered by large or small rock falls (Solecki 1959;Solecki 1972).

The Palaeolithic human remains in the Shanidar cave all derive from Layer D. Within this layer there are two concentrations of archaeological and skeletal remains (Defleur 1993). Shanidar I, III and V derive from the top of the layer. Shanidar II, IV, VI, VII, VIII and IX derive from the middle and lower parts of the layer. In layer D two concentrations of occupation can be distinguished, parallel to the two concentrations of skeletons (Figure 7)(Schwartz*, et al.* 2003).

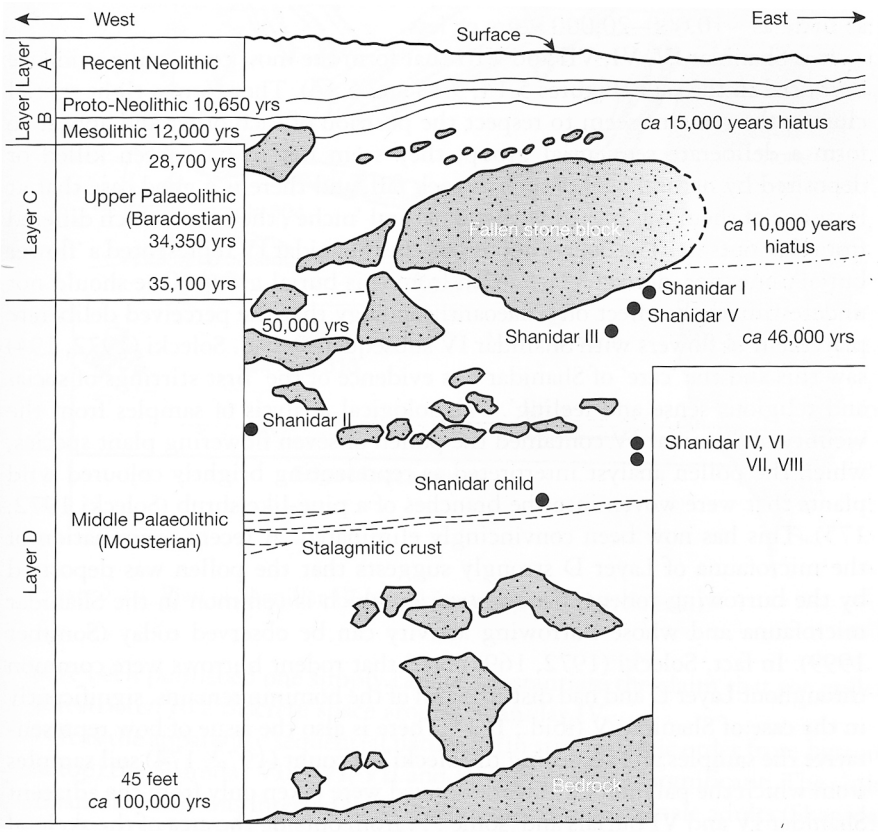

Figure 7 Shanidar human remains in the sections (Pettitt 2011)

All human fossil remains were found in close spatial association with Levalloiso-Mousterian lithics, faunal remains, ash and hearths (Pettitt 2011). Although the layer is thick, the lithic assemblage displays little variation (Solecki 1959;Schwartz*, et al.* 2003).

Shanidar I was oriented east-to-west, with its feet to the west. He was situated in a space defined by heavy blocks of limestones. The context consisted of fragmented remains of animal bones, charcoal and flint. Close to the skull, at a distance of 25 cm, a contemporaneous hearth was found (Solecki 1959;Defleur 1993).

Shanidar II lay with his head facing east on a stone of 8 cm by 12 cm. In the context there were many fragmented remains of a mammal mandible (Solecki 1959;Defleur 1993).

Shanidar III was orientated east-to-west. He was placed in a crevasse of stones. Close to the human remains two contemporaneous hearths were found (Solecki 1959;Solecki 1971;Defleur 1993).

Shanidar IV lay with his head to the south, facing west. He was situated near a horizontally lying stalagmite and covered with half a metre of lime stone gravel. The corpse was placed in a niche of big stone blocks. Soil samples revealed large quantities of pollen close to the skeleton. These were thought to have entered the cave by flowers brought by humans inside. The pollen derived from eight different, small and colourful flower species, which moreover had meditational significance (Solecki 1959;Defleur 1993).

Shanidar V was placed under blocks of stone. Close to the cranium, traces of fire were found. In addition, the fragments of the mandibula of a large mammal were found close to the skeleton. Stratigraphy showed that Shanidar V was contemporaneous with Shanidar I (Solecki 1959;Defleur 1993).

Shanidar VI, VIII and IX were found together, their bones intermixed.

Shanidar VII was pointing with his head to the north. Although badly preserved, all bones were articulated. However, no (burial) pit was recovered.

4.5.2. Discussion

According to Solecki (1963), the rock falls caused the death of most individuals. He believed that the conspecifics of the killed individuals, the survivors of the rock falls, returned and heaped loose stones and animal bones over the corpses and performed funerary rites, involving fire. Other researchers (Schwartz*, et al.* 2003;Pettitt 2011;Defleur 1993;Binant 1991) believe that all human remains represent deliberate burials.

Shanidar I was interpreted as having been killed by the collapse of the cave's ceiling and then intentionally inhumated by survivors of the rock falls. The

bones were broken, sheared and crushed and some stones were found in direct contact with these bones. The lower parts of the skeleton were articulated and the upper part of the skeleton was not, suggesting that the individual was in an upright position when hit by the rock fall(Solecki 1959). According tot Defleur (1993) Shanidar I represents a burial, as the head, in an upright position and resting on its base, indicates that the corpse was inhumed in a pit: the corpse was deposited on its back, the body slightly inclined to the right side, the left arm band, hand on the chest and the legs extended. Later, the pit was filled with other sediments and covered by rocks. A subsequent collapse of the cave's ceiling further covered the burial and broke some of the bones (Defleur 1993).

According to Solecki (1959), Shanidar II was killed *in situ*, overwhelmed by a rock fall or a landslide. After his death, the conspecifics of Shanidar II came back and placed some stone on the corpses and lighted a funerary fire above the corpse. Defleur (1993) interpreted Shanidar II as an intentional burial. The corpse was placed on a paved surface, with the skull resting on a stone.

Shanidar III was initially interpreted by Solecki (1959) as an individual that died *in situ* from a fight with hostile neighbours, as he lay in a stretched position, with a wound at a left costa made by a wooden instrument. However, according tot Delfeur (1993), the dead person was buried in a small, circular pit, covered by blocks of stone.

Shanidar IV represents a deliberate burial, even according to Solecki (1959). The most important argument was the high proportion of pollen in samples around the human remains, leading to the interpretation as a *flower burial*. According to Solecki, none of the flower pollen could have been accidentally introduced to the grave. They must have been interred with the corpse as bouquets or clumps of flowers (Solecki 1977). However, a more recent study contradicted this conclusion (Sommer 1999). Zoological data suggest that a small rodent native to the Shanidar region is capable of having introduced enough flower heads into the cave to account for the pollen found near Shanidar IV. According to Sommers, the flowers are no proof of cognitive

skills of love and beauty and the full range of human feelings. Other evidence for intentional burial includes the flexed position, the location defined by stones and the geological association: the soil at about the burial level was markedly moister that the soils above (Solecki 1977;Pettitt 2011).

Shanidar V was probably in a crouched position when killed by rock fall. The fire has been explained as a funeral rite after its death (Solecki 1977). According to Defleur (1993), the skeleton was deliberately buried, as suggested by its anatomical position and articulation, the presence of the lime stones and the mandibula of a large mammal.

Shanidar VI, VIII and IX together are a possible secondary multiple burial. According to Delfeur (1993), it is equally probable that they were buried together on purpose or by accident. However, he prefers the former explanation, as it would be too coincidental to accidentally bury three individuals (or even four, if Shanidar IV is included) exactly one above the other. The incompleteness and disarticulation of Shanidar VIII and IX indicate that they could be a secondary burial (Solecki 1959;Defleur 1993).

Shanidar VII was not found in the context of funerary features. However, the articulation and the position of the skeleton indicate the corpse of this infant was intentionally buried (Defleur 1993).

4.5.3. Mortuary space

Most scholars (Solecki 1959;Solecki 1971;Solecki 1972;Solecki 1977;Pettitt 2011;Defleur 1993;Binant 1991) agree that at least some individuals at Shanidar were deliberately buried and that during the Middle Palaeolithic mortuary practices and funerary activities occurred there.

It seems highly unlikely that all people were killed or buried in the cave at one time, as the stratigraphy shows several reoccupation after at least four rock falls (Solecki 1959). According to Delfeur (1993), Shanidar IV, VI, VIII and IX represent a succession of single or perhaps even multiple burials.

4.6. Krapina

4.6.1. Introduction

The site of Krapina, a town near Zagreb, Croatia, is situated in a rock shelter on Husnjakova Hill (Schwartz, *et al.* 2001) and was excavated from 1899-1905 under the direction of Karl Gorjanovic-Kramberger.

Gorjanovic-Kramberger initially believed the nine stratigraphic layers to have accumulated rapidly, in no more than 8.000 years. This was recently confirmed by electron spin resonance dating, which showed that these layers were from around 130.000 BP (Schwartz, *et al.* 2001;Rink, *et al.* 1995).

The Krapina fossil remains consist of hundreds of bone fragments and isolated teeth. Most of the represented individuals are fairly incomplete (Trinkaus 1985;Schwartz, *et al.* 2001). The site is recognized to contain the largest and richest sample of Neanderthal fossils ever found on a single site (Caspari and Radovčić 2006). The number of individuals is not clear. The sample represents at least twenty three individuals (Trinkaus 1995) to eighty two individuals (Wolpoff 1979). According to Binant (1991), the distribution of finds is too big to recognize any relationships between the skeletal remains.

Some rarely well-preserved skeletal elements were found at Krapina. This does not agree with expectations from Palaeolithic remains that have been interred through subsequent sedimentation in the rock shelter. These typically exhibit a selection of better preservable skeletal elements. In addition, this inclusion of smaller and more fragile bones indicates the rapid burial of the remains, whether unintentional, natural burial under falling rocks or a deliberate burial by conspecifics of the dead (Trinkaus 1985).

Nine major levels were identified by Gorjanovic-Kramberger, among which layer 3 and layer 4 were described as the '*Homo sapiens* zone' because they contained most of the human fossils remains (Caspari and Radovčić 2006). No burial features (e.g. pits) were identifiable, as the stratigraphy was

disturbed. The rapid accumulation of the layers is supported both by dating techniques and the preservation of certain fragile and usually seldom preserved skeletal elements.

Hominid remains were accumulated in several groups. This, together with the presence of hearths, lithics, butchered and burned fauna, represented in all layers, thus spanning the entire time period, indicate two occupations.

4.6.2. Discussion

Although he considered the distribution of finds is too big to recognize any relationships and although no burial structures were identified, Binant (1991) suggested that the remains at Krapina could represent 'real' multiple burials, meaning an original single pit containing more than one corpse. This would be a rare exception to the Middle Palaeolithic burials, as in this period only single burials are known (Binant 1991). Trinkaus (1985) suggested that the remains were intentionally buried because he identified a pattern of preservation of skeletal elements similar to recent human burials. However, he could not exclude the rapid, unintentional burials of the individuals due to rock falls (Trinkaus 1985) .

4.6.3. Mortuary space

Because of the high degree of fragmentation and disassociation and the apparent cut marks on many bones Krapina was traditionally interpreted as a site of Neanderthal cannibalism. Both Trinkaus (1985) and Russell (1987).

None of the damage patterns on the Krapina bones could solely be explained as products of cannibalism. Most are normal effects of sediment pressure on bone and usual results of post-depositional disturbance, geological processes and excavation techniques, thus offer no evidence for cannibalism (Trinkaus 1985).

In addition, it was demonstrated that the striations on the fossils are more consistent with post-mortem processing of corpses with stone tools. The

gross appearance, anatomical location and orientation are similar to confirmed cut-marks on corpses defleshed as preparation to secondary burial (Russell 1987).

According to Pettitt (2011) Krapina clearly had a mortuary function, as many individuals who did not die at the same time were buried on the same location. The relatively short time period of 8.000 years could indicate that a tradition existed and was transmitted through several Neanderthal generations.

5. Evaluation

5.1. La Ferrassie

Ferrassie is clearly a multiple burial site. Human remains of seven individuals are well preserved and articulated. They are mostly protected by structures, such as deliberately dug pits. Animal damage on the bones has not been noted.

The corpses could have been prepared for burial. Some individuals (e.g. LF 1 and LF 2) lay in positions that must have been intentional. Especially the fact that LF 1 and LF 2 are lying so close together in the same position and in reverse suggests deliberate placement of the bodies. The flint tools and faunal remains found in some pits cannot be treated as conclusive evidence of grave offerings. They comprise only a few, variable objects that could have been accidentally preserved with the human remains.

There is evidence of spatial restriction and organization. The four groups are restricted to the rear wall and the central area. Within these clusters, the burials are pairwise and similar in structure, age of the individuals and position of the corpses. The adults are situated at the one end of the cave. This organization cannot be accidental. Flint assemblages are present, but other occupational features have not been found. This could suggest that the place of the burials was distinct from the occupational place. A temporal restriction is less evident.

5.2. La Quina

La Quina contains at least twenty-three people who have been possibly buried along the river stream at several times in a period of thousands of years. The number of individuals found could indicate a possible mortuary space. However, only the possible deliberate burial H5 can be recognized.

In order to decide whether H5 could be a burial, several aspects can be taken into account. Firstly, the anatomical position of the skeleton, which was

placed horizontally, facing towards the valley, with all limbs on one side, could explain its location. It is improbable (although not impossible) that a corpse accidentally ends up in this position, which is very similar to positions of corpses that have been intentionally inhumated. Further examination of the possible causes of this anatomical position requires further research by a forensic specialist on the original drawing (which to me was not available). Ecological and geological research concerning the water level and general context of H5 could also assist in the interpretation. Consequently, scenario B and scenario C (see the La Quina description) require further specialized research.

Secondly, if we would assume that the location was under water level, it would be difficult to explain how as many as twenty individuals ended up at this location. It would be hard to imagine twenty-three people falling down the same cliff, unless it was during a single catastrophic event. However, the stratigraphy suggests that the individuals were not simultaneously interred, as they were in different layers. Consequently, scenario A (see the La Quina description) is implausible.

The pit with the two teeth on its periphery and the rich flint context of H5 are no unambiguous indicators of intentional burials. The pit does not contain sufficient evidence for a funerary function. As it is irregular and subcircular and as the remains were not found in the pit, there is no indication that it was dug intentionally as a burial structure. The flint could just be waste material. Its high quality is no reason to explain it as ritual.

There are two important clues to a possible funerary function at La Quina, firstly, the high number of individuals. In order to understand their presence on the site, geological research is necessary to investigate the accumulation of the bones. Secondly, the presence of a processed human bone indicates some activity in relation to death, whether practical or ritual. In conclusion, due to lack of evidence, it is not clear whether La Quina is a multiple burial site.

Temporal restriction is indicated by the two occupational periods that can be distinguished. Both (osteo)archaeological concentrations and the different dating techniques indicate two periods of site use, both lasting several thousands of years. Spatial restriction of human remains is not evident.

5.3. Amud

All evidence suggests that Amud is a multiple burial site. Firstly, there is a relatively high amount of partially complete, articulated and preserved human fossils. The completeness of Amud 1 is particularly interesting with respect to its location at the centre of the cave. Not all individuals are complete and well preserved. However, this could be due to the smaller and more fragile bones of the high number of immature individuals. Secondly, at least one skeleton is associated with a natural feature that could act as a burial structure (the niche). Thirdly, the position of the skeletons could indicate deliberate burial. Lastly, the red deer maxilla may indicate a grave offering, as it is a unique skeletal element at the site, well preserved in contrast to the other fragmented faunal remains, and in contact with the skeleton of Amud 7. However, we need more similar finds in order to establish a pattern that allows us to interpret it as a grave offering. Moreover, if similarly preserved animal remains are found not in contact with any human remains, the red deer maxilla should be refuted as a grave offering.

The human remains are found in only two stratigraphic levels, which are dated to ten to twenty thousand years. There are two clear occupational and osteological concentrations. The combination of the above suggests a temporal restriction at Amud. A clear spatial restriction is also visible at the site. It is possible that this is due to the methods of sampling but it could also be a reflection of behaviour. The cave's wall is a natural feature that is associated with possible burials. At least one skeleton (Amud 2) is cached in a smaller natural feature.

The presence of the above features and relationships makes Amud a possible mortuary space tradition site. Having stated this, there remains a possibility

that the site is a dumping zone for corpses. This could be verified by the analysis of faunal remains.

5.4. Shanidar

Most human remains at Shanidar are situated in spaces defined by stones. Although this could be due to rock fall, there is enough evidence to suggest burial structures. The corpses could have been deliberately placed in natural or artificial stone structures in order to protect the dead. There is also some evidence of burial pits.

The completeness, preservation and articulation of the skeletons are remarkable. Animal damage by carnivores is not noted, although smaller animals, like rodents, could have caused the loss of some smaller bones.

Some of the bodies seem to lie in positions in which they could intentionally been placed (e.g. with one hand on a chest). However, a clear pattern is not apparent either in orientation or in stature. Traces of bone processing are absent. Some of the skeletons (Shanidar VIII and IX) suggest a secondary burial, as they are incomplete, disarticulated and buried together with two other individuals (Shanidar IV and VI). It is noteworthy that in this group of burials and possible secondary burials are the only two women and one of the two infants found at the site.

There are no exceptional objects found near the human remains that could have served as grave offering but several traces indicate fire contemporaneous with the inhumation of the skeletons. These could have been mortuary practices. The possibility of flower bouquets is no indicator for intentional burial, as it is still not clear whether the pollen entered the cave naturally or through humans.

Spatial restriction is not easily visible within the cave. It is clear that the burials occurred in occupational contexts. Also, the vertical sequence of burials Shanidar IV, VI, VIII and IX in the centre of the Shanidar cave could indicate spatial organization. Temporal restriction is evident: there are two

clusters in which several human remains were interred, possibly in a period of maximally ten to twenty thousand years. The clusters are parallel with occupation phases, as suggested by concentrations of other archaeological remains. The groups of human remains are interrupted stratigraphically by rock falls, followed by reoccupation. This could suggest that the human remains do not indicate a single tradition. Overall, although clear spatial organization is lacking, the other characteristics at Shanidar suggest that the site could be mortuary space.

5.5. Krapina

Although no burial features were discovered at Krapina, which is mostly due to the disturbed stratigraphy, it is evident that the high number of individuals found there was subjected to mortuary practices. This indicates a clear ritual mortuary function at the site of Krapina. At least twenty-three individuals were ritually processed over period of several generations.

Temporal restriction is indicated by the rapid accumulation of the stratigraphic layers. This is demonstrated by both geological features and the preservation of small and fragile skeletal elements. ESR dating finally confirmed that the nine stratigraphic layers were formed in only 8.000 years. Moreover, the period in which the burial took place could be even more restricted, as most human remains come from only two of these stratigraphic layers. Evidence on possible spatial organization is not present in the documentation and maps of the excavation. Concluding, although no actual burials are found, the ritual processing and temporal restriction indicate that Krapina could be a mortuary space.

5.6. Overview of mortuary spaces

We can summarize the features of each site in an overview of the site and the burials in it with respect to the hypothesis of this research (Table 4), that Neanderthals distinguished mortuary spaces. This helps identify elements that could relate to a tradition.

Table 4 Overview mortuary spaces

Mortuary spaces									
General		Multiple burial			Temporal restriction			Spatial organization	
Name	Cluster	Nr of individuals	Main burial structure	Treatment body	Dating	Dating range	Occupation	General location burials	Association burials
La Ferrassie	West	7	Pits	General deliberate anatomical positions, general EW-orientaton	60-70 ka	Unkown	Unknown	Wall and centre, near natural features	Yes, pairwise
La Quina	West	20 (to 27)	None	Some processed and used bones	40-65 ka	Unkown	Yes, several	Unknown	Unknown
Amud	East	16 (to 18)	Natural structure	2 skeletons similar orientation	42-49, 50-60 ka	Unkown, but short	Yes, two concentrations	Wall, northwest part	No
Shanidar	East	9	Stones	General deliberate anatomical positions	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations	Centre / unknown	Yes, at least one concentration
Krapina	None	23 (to 82)	Unkown	General ritual processing	130 ka	max 8.000 y	Yes, two concentration	Unknown	Unkown

La Ferrassie, Amud and Shanidar appear to be mortuary spaces, while Krapina is clearly associated with mortuary practices. However, multiple burials are not identified there. Interestingly, Krapina is by far the earliest site. The differences between it and the later sites may indicate an evolution of mortuary practices among Neanderthals, although to verify such a claim, a larger number of relevant sites should be studied. Another explanation could be that its age accounts for poorer perseveration, including fragmentation e.g. through taphonomic processes. La Quina cannot be recognized as mortuary space, since the assumed multiple burials at this site cannot be confirmed yet. Future research could shed light on the interment of the human remains there.

5.7. Common patterns and general characteristics

Table 1 in the appendix is an overview of all burials at the case sites containing the primary features of deliberate inhumation and mortuary space. It reveals similarities and differences between the sites and helps identify features and relationships that typify each site. These refine and specify the criteria for the identification of mortuary spaces: multiple burials, spatial organization and temporal restriction.

5.7.1. Multiple burials

The case analyses show a pattern of multiple burials. At most sites (La Ferrassie, Amud and Shanidar) the majority of the individuals seems to have been deliberately protected from disturbances, resulting in completeness, preservation and articulation of the human remains (Table 6). The protection came from burial structures, such as stone structures or pits, which are often associated with or made of natural features present at the site. At Shanidar, for example, the structures are made of lime stone blocks which are abundant at the site due to its regular rock fall. A general pattern in burial structures is not visible between sites but the relationship to local natural resources is universal and intrasite common features are also evident.

Many individuals were treated in a specific way, which indicated preparation for death. The anatomical position seems to be intentional. A preference for the east-to-west orientation of corpses is visible at La Ferrassie and Shanidar, although at Shanidar several individuals are oriented north-to-south. Processing of the corpse occurred on occasion but there is no discernible general pattern.

Within the burial groups identified at different site but also for whole sites there are similarities in burial structures and the treatment of bodies (

Table 5). Such similarities indicate that, although no general tradition can be traced from the (osteo)archaeological remains, a tradition is visible at each site or at least for each period of a particular site.

Lastly, additional objects found in the context of the skeletons could be explained as grave offerings. Nevertheless, it is not clear if Neanderthals made grave offerings at all. Moreover, the objects considered in this research do not display a general pattern that could support identification of mortuary space.

Table 5 Overview of burials at the key sites

Burial traditions					
Human remains	**Location**			**Treatment**	
Individual	**Location**	**Grouping**	**Structure**	**Deliberate posture**	**Orientation**
LF 1	Wall, west corner	Yes, LF 2	Stones in pit	Yes	EW / WE
LF 2	Wall, west corner	Yes, LF 1	No	Yes	WE / EW
LF 3	Central	Yes, LF 4b	Pit filled with stones	No	EW
LF 4b	Central	Yes, LF 3	Pit filled with stones	No	EW
LF 5	Wall, near entrance, edge of sediment mounds	Yes, LF 8	Depression	No	EW
LF 6	Centre, east corner, bowl-shaped depressions	No	Triangular pit within depression, covered with stones	No	EW
LF 8	Wall, near entrance, edge of sediment mounds	Yes, LF 5	Depression	No	EW
H5	Near or in river	No	No	Perhaps	Unknown
various La Quina	Unknown	Unknown	No	No	Unknown
Amud 1	Wall, northwest part, under drip line	Unknown	No	Unknown	Unknown
Amud 2	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 3	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 4	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 5	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 6	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 7	Wall, northwest part	Unknown	Niche of wall	Unknown	Unknown
Amud 8	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 9	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 10	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 11	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 12	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 13	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 14	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 15	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 16	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 17	Wall, northwest part	Unknown	No	Unknown	Unknown
Amud 18	Wall, northwest part	Unknown	No	Unknown	Unknown
Shanidar 1	Unknown	Unknown	Yes, stones	Yes	EW
Shanidar 2	Unknown	Unknown	Yes, head on a stone	No	Unknown
Shanidar 3	Unknown	Unknown	Yes, stones	Yes	EW
Shanidar 4	Central, (same spot as 6, 8 and 9)	Unknown	Yes, stones	Yes	SN
Shanidar 5	Unknown	Unknown	Yes, stones	Yes	NS
Shanidar 6	Central, (same spot as 4, 8 and 9)	Unknown	No	Yes	NS
Shanidar 7	Unknown	Unknown	No	Yes	NS
Shanidar 8	Central, (same spot as 4, 6 and 9)	Unknown	No	No	Unkown
Shanidar 9	Central, (same spot as 4, 6 and 8)	Unknown	No	No	Unkown
various Krapina	Unknown	Unknown	Unknown	Unknown	No

5.7.2. Spatial organization

Spatial organization is clearly present at La Ferrassie and Amud, and is probable at Shanidar (Table 6). In general, burials are clustered along cave walls, often even specific parts of the wall, or at the centre of the cave. Few burials are situated in the intermediate area (between wall and central points). The spatial position and organization of the burials are associated with local natural elements (as are the burial structures), such as a drip line (Amud), sediment mounds or natural depressions (La Ferrassie). The spatial organization does not indicate a clear distriction between mortuary space and occupational area. At several sites, grouping of burials is apparent and moreover clearly linked to natural features.

Spatial restriction is visible at more recent excavations, which are generally better documented. Better methods of documenting spatial relations could be useful in further examining mortuary space among Neanderthals.

Table 6 Overview of the location of the burials at the key sites

Where they were buried		
Human remains	**Location**	
Individual	**Location**	**Structure**
LF 1	Wall, west corner	Stones in pit
LF 2	Wall, west corner	No
LF 3	Central	Pit filled with stones
LF 4b	Central	Pit filled with stones
LF 5	Wall, near entrance, edge of sediment mounds	Depression
LF 6	Centre, east corner, bowl-shaped depressions	Triangular pit within depression, covered with stones
LF 8	Wall, near entrance, edge of sediment mounds	Depression
H5	Near or in river	No
various La Quina	Unknown	No
Amud 1	Wall, northwest part, under drip line	No
Amud 2	Wall, northwest part	No
Amud 3	Wall, northwest part	No
Amud 4	Wall, northwest part	No
Amud 5	Wall, northwest part	No
Amud 6	Wall, northwest part	No
Amud 7	Wall, northwest part	Niche of wall
Amud 8	Wall, northwest part	No
Amud 9	Wall, northwest part	No
Amud 10	Wall, northwest part	No
Amud 11	Wall, northwest part	No
Amud 12	Wall, northwest part	No
Amud 13	Wall, northwest part	No
Amud 14	Wall, northwest part	No
Amud 15	Wall, northwest part	No
Amud 16	Wall, northwest part	No
Amud 17	Wall, northwest part	No
Amud 18	Wall, northwest part	No
Shanidar 1	Unknown	Yes, stones
Shanidar 2	Unknown	Yes, head on a stone
Shanidar 3	Unknown	Yes, stones
Shanidar 4	Central, (same spot as 6, 8 and 9)	Yes, stones
Shanidar 5	Unknown	Yes, stones
Shanidar 6	Central, (same spot as 4, 8 and 9)	No
Shanidar 7	Unknown	No
Shanidar 8	Central, (same spot as 4, 6 and 9)	No
Shanidar 9	Central, (same spot as 4, 6 and 8)	No
various Krapina	Unknown	Unknown

5.7.3. Temporal restriction

Temporal restriction is fairly difficult to detect in a literature-based study. The suggested dating ranges are not clear from the available data and, although relative short, often comprise thousands of years.

As the dating range is difficult to detect with dating methods, stratigraphy could be more helpful in detecting one or more mortuary space traditions. All sites except for La Ferrassie contain reoccupations or several occupational concentrations, parallel to concentrations of human remains and burials. This may suggest recurrence of a tradition of the same population but equally well lack of a single tradition, e.g. due to occupation from several populations.

However, when using stratigraphy in studying temporal restriction at a site, it is important to realize that the dating range of sediment deposition may not be the same as the dating range of the event of a burial. On the one hand, this makes it even more difficult to date the burials at the sites. On the other hand, it suggests that the dating range of burials could be shorter and that the mortuary spaces were truly temporally restricted.

6. Discussion

Investigating mortuary behaviour among other hominins could indicate cognitive capacities of the species, reflect social aspects and show cultural aspects of a society. Determining the existence and occurrence of mortuary spaces among Neanderthals and detecting relevant patterns in general and per site allow interpretation of the meaning and use of mortuary spaces. Furthermore, it fits with the ongoing discussion on the modernity of Neanderthal behaviour and the scenario of the evolution of mortuary behaviour.

6.1. Interpretation

The questions relating to the main features of mortuary space that emerge from this research are:

- *Who were buried at mortuary spaces?* This question relates primarily to multiple burial.
- *How are these traditions transmitted*? This question relates to the temporal restriction of mortuary space.
- *Was the landscape really dichotomised in places of the living and places of the dead?* This question relates to the spatial organization in and around mortuary spaces.

6.1.1. The buried ones

One major component of society and burial on which is could shed light is who were buried. All main demographic groups are represented in the burials: men, women and subadults (Table 7). There is a slightly higher number of males in comparison to females and a slightly higher number of subadults in comparison to adults. Over the total number of individual, the females are underrepresented (only three out of thirty-seven individuals). This could indicate social differences in Neanderthal culture and society between men and women.

The high proportion of subadults is striking. It could be simply explained by the higher mortality of subadults (especially neonates). However, this does not explain the good preservation of their remains. Being smaller the bones of younger people are more fragile but subadults remains at the studied sites were preserved quite well and in large quantities. This may indicate that subadults were intentionally buried more often than adults. Special treatment of dead infants has a long history, dating far further back than the Neanderthals. In core mortuary practices infanticide is not rare. Many observations of chimpanzee mortuary behaviour are from mothers and their dead offspring. The possible focus on subadults in Neanderthal burials could descend from mother-infant bonds, provoking strong emotions in detachment processes. This could suggest that Neanderthal burial emerged from emotional reasons, in contrast to reasons of hygiene or social pressure.

Table 7 Demographic overview of the buried ones

The buried ones		
Adults	Male	6
	Female	3
	Unknown	7
	Total	*16*
Subadults	19	
Other	2	
Total	37	

The burial sample comprises of very few individuals for such as long period, suggesting that these individuals were somehow different and thus selected from the entire population, serving as (symbolic) monuments. The fact that men, women and children all are represented could mean that it was important to represent the whole society in these monuments. The spatial organization and composition of individuals at La Ferrassie, i.e. two adults (one man and one woman) and subadults in different age categories, is reminiscent of a nuclear family: the parents are buried in parallel, in reverse

posture, with their head close to each other, with their children on the other site of the cave. This does not necessarily mean that the individuals were related in reality.

6.1.1. Transmission

The existence of traditions, even per site or per group, implies some sort of transmission. Firstly, this requires a cognitive capacity for an elaborate communicative system among Neanderthals, comprising of e.g. spoken language. Secondly, it suggests some things must have served as markers for recognition of the mortuary spaces and were associated with death in long-term and widespread traditions. However, in the studied sites no clear grave markers have been found and no common features ultimately distinguishing the mortuary spaces from the rest of the landscape could be detected. One possibility is that the grave and mortuary space markers have perished, e.g. because they were made of organic materials. Another possibility is that the mortuary spaces were situated in a specific setting. The sample contains examples situated near caves and in an occupational context. It is possible that in Neanderthal society the appropriate place for burial was recognized by various features, which were not specifically related to mortuary practices.

The location of mortuary spaces does not display a general pattern but restrictions or patterns are visible per site or per group. In the choice of area for burials, creative landscape use seems to have been involved. Burial structures, anatomical positions and additional objects do not show a general pattern either but clearly indicate local traditions related to local natural resources. The dominant orientation of east-to-west is striking, as it is probably linked to the trajectory of the sun. The use of local natural features is an extension of funerary caching and relates to the importance of the landscape and natural environment for Palaeolithic hunter-gatherers. It could also relate to the mobility of the Neanderthal groups. As they were not sedentary, they had to improvise the burial of group members where they died and be creative with the available materials.

6.1.2. The dichotomized landscape

Neanderthal mortuary spaces are often situated in occupational contexts. In addition, as described above, the whole landscape and local natural resources were involved in organizing multiple burial places. This raises the question whether the landscape was really dichotomized in places associated with the living and places associated with the dead. Anthropological studies indicate that in many societies, domestic practices are not spatially segregated from economic, ritual or informal political activities (Tiffany 1978): ritual and secular activities do not need to be mutually exclusive in *Homo sapiens* societies. The question is whether we can extent this claim to Neanderthal populations.

6.2. Implications

6.2.1. Evolution of mortuary behaviour

The existence of mortuary space on Neanderthal sites agrees with our current understanding of the evolution of mortuary behaviour, as outlined by the five evolutionary phases described in "Evolution of mortuary behaviour." The three mortuary spaces studied here exhibit characteristics that fit in the modern mortuary phase. There is clear association of places in the landscape with the dead. This is reinforced by multiple burial. Consequently, the research not only verifies existing theories of evolution but also identifies specific characteristics through which we can trace the patterns of this evolution, for example relationships to local natural features. Such characteristics can be instrumental in analyses of sites with respect to mortuary phases, as they facilitate early recognition of mortuary space. Furthermore, the existence of mortuary space among Neanderthals indicates possible prototypes for the subsequent advanced mortuary development with its cemeteries.

Neanderthal mortuary practices suggest that also in this respect we are not unique and concepts of places associated with burial and death exist beyond our own modern species. If *Homo sapiens* and *Homo neanderthalensis* both

use mortuary space, we can suggest that our last common ancestor, *Homo heidelbergensis* had the capacity for symbolic organization of the landscape. Moreover, as we see similar behaviour in the inhabitants of Atapuerca, *Homo antessessor*, it could be possible that other species of the genus *Homo*, e.g. *Homo erectus*, had similar notions concerning symbolic spatial concepts.

The extensive use of local natural features, suggests that mortuary spaces originated from funerary caching, in combination with the emergence of formal burial. In theories of cognitive archaeology, combinations of common practices or object are considered as key moments of innovation (Beaune*, et al.* 2009).

It is possible that mortuary behaviour emerged with territoriality. It has been suggested that territoriality occurred among early australopithecines and *Homo*, serving as a demographic regulating device (Zubrow and Daly 1998). In early hominids conscious knowledge of location and the ability to represent and communicate spatial information was advantageous for the predators in predator-prey relationships (Zubrow and Daly 1998).

A further question is whether mortuary space has practical or symbolic foundations. Spatial distinction between the dead and the living, e.g. burials and food preparing areas, could have occurred for hygienic reasons. However, it could have been stimulated by emotional expression as a reaction to detachment and to confusion in the established social order. These would have made consolation, sharing emotions and symbolically expression necessary. Unfortunately, there are too few clues that would suggest either foundation on the study sites, e.g. grave offerings.

6.2.2. Modernity of Neanderthal behaviour

The existence of mortuary space among Neanderthals implies modern behaviour. According to Nowell (2010), modern behaviour consists (1) abstract thinking, (2) planning depth, (3) behavioural, economic and technological innovativeness and (4) symbolic behaviour. There is a growing

consensus that the most important trait and perhaps even essence of modern behaviour is symbolism, including language and codified social relationships.

The results of this research indicate abstract thinking, planning depth and symbolic behaviour in Neanderthals. Abstract thinking is reflected in the association of a place with specific practices and an abstract concept: death. Transmission of a tradition of mortuary space requires planning depth: that a place is structured, organized and used with clear perspectives concerning the future. The organized behaviour could not have occurred without cooperation, which implies communication and codified relationships, e.g. language. Furthermore, cooperation between different members of a group must have occurred, even diachronically, as the tradition was transmitted. Symbolic behaviour seems to be an important aspect of mortuary space. Although motivation cannot be directly detected in the archaeological record, burial is generally regarded as symbolic: there must have been deliberate reasons for such a labour-intensive act. Mortuary spaces are even more labour-intensive because they involve multiple burials, which are organized in space, and traditions transmitted through time. Such characteristics make mortuary spaces important carriers of symbolism.

The development of symbolic capacity can be divided into five stages, described by (Pettitt 2011, 266-7):

1. Simple (non-symbolic) observation, with little activity occurring beyond expression of emotions, morbidity, social theatre and funerary gatherings
2. Emotive (non-symbolic) interaction, including further engagement with the dead and emotional responses affecting simple behaviours of disposal
3. Passive associative (non-symbolic or symbolic) interaction, where the dead is associated with a specific activity at a specific place (symbolising the dead)

4. Active associative (symbolic) interaction, where energy is invested in the place of disposal (deliberate modifications that suggest specific meaning)
5. Time / space-factored associative interaction, where the agency of the dead is recognised in mortuary treatment and mortuary activity is organized in time and space, according to social rules

Mortuary space on the sites studied here fits the fourth and possibly the fifth stages of symbolism. Arguably, the most important question about the symbolic nature of mortuary spaces concerns the specific meaning of mortuary space and what exactly it represents. The exact meaning of these death places is hard to trace. However, from anthropological evidence we know that the place of the dead is important in cosmology. "*Where we put remains of the dead is […] a thought-out activity by which the dead are both remembered and forgotten, and we construct […] a place and identity*" (Pearson 1999). For example, in most societies, the orientation of graves is significant and reflects concepts of the symbolic worldview. Moreover, in many societies map-making is not a secular but a religious ideological activity. Maps show the geographical relationship between cosmological locations and the area of local interest.

Territoriality is often relevant in placing the dead. The places of the dead often form borders or edges, possibly indicating the gate to the underworld. However, they can also represent the centre of an area, as in the structuralist notion of Mircea Eliade, which suggests that the world can be defined from the centre. In either case, mortuary spaces are a clearly defined territory. It is not easy to detect if Neanderthal mortuary spaces were situated at the centre or border of a living area but the fact that they are often in occupational contexts supports the idea of territoriality, e.g. a possible indication to rival groups that a cave was already occupied – a useful notion for mobile hunter-gatherers.

Studying mortuary space and mortuary behaviour is useful in determining modern behaviour by specific species. A common problem in studying the

modern behaviour of Neanderthals is that it is often impossible to relate lithics to human fossils. This problem occurs e.g. in the Châtelperronian industry, where it is not clear if *Homo neanderthalensis* or *Homo sapiens* produced the personal adornments. However, mortuary space is a clear example of modern behaviour and can be directly connected with Neanderthal behaviour.

These findings agree with the decoupling of modern anatomy and modern behaviour, as suggested by Nowell (2010). It shows that modern behaviour is not unique for Anatomically Modern Humans. Modern behaviour emerged through a gradual evolution, with deep roots of development. Within the current discussion on the emergence of modern behaviour, one theory suggests a sudden revolution in Africa around 50.000 BP, while the another opines that modern behaviour evolved gradually, possibly from the last common ancestor of Neanderthals and Anatomically Modern Humans. The existence of mortuary spaces among Neanderthals, displaying modern behaviour as early as 80.000 BP (at Shanidar), makes a gradual evolution of modern behaviour more likely.

One final question concerns the origins of aspects of modern behaviour, including mortuary space. It is unclear whether they emerged in parallel in Neanderthals and Anatomically Modern Human out of shared cognitive capacities or if they spread from Anatomically Modern Humans to Neanderthals, e.g. trough trade or imitation. It is possible but unlikely that they spread in the reverse direction.

6.3. Research limitations and future research

This research is literature-based, which means that interpretation was based on interpretation. Further complications were caused by the lack of detailed information, unavailable or inaccessible documentation. Moreover, most excavations took place long ago, with old methods and techniques. Currently we can be more precise in e.g. dating or geology and have access to advanced

techniques like DNA analyses. The sample studied is quite small, making it hard to generalize or detect common patterns.

These limitations suggest directions for further research. Existing documentation could be improved by involving new specializations, e.g. osteoarchaeologists or geologists, who could provide new insights concerning anatomical position or site formation processes. New excavation would obviously be welcome, as they could dramatically increase the sample for similar studies, and would benefit from new methods and techniques. Equally important would be that we could consider sites from the mortuary space perspective, e.g. pay particular attention to association with local natural features.

7. Conclusion

Neanderthal fossil sites containing more than one individual are not a rare phenomenon. On at least thirteen of the twenty-nine sites in the study two or more Neanderthals have been found.

Three of these sites (La Ferrassie, Amud and Shanidar) are intentional multiple burial sites. This is made evident by the protecting burial structures for the corpses, the preservation of the human remains and the deliberate anatomical positions in which they lie.

Spatial organization is visible in the same three sites. The burials are associated individually, pairwise or in groups with local natural features. Most sites are in an occupational context. This does not necessarily preclude a dichotomy between places for the living and for the dead in the landscape.

Although difficult to detect in a literature-based research, at least three sites (La Ferrassie, Krapina, Amud and Shanidar) seem to be temporally restricted. Detecting concentration of occupation and associated burials through stratigraphy are more helpful than absolute dating techniques in this respect.

General patterns are not detectible but they appear to exist for each site, e.g. in orientation or burial structures. Local natural elements are highly involved in burial structures and in spatial organization, indicating creative landscape use, which could account for the locality of traditions. Grave or mortuary space markers for transmitting these traditions are not visible.

In conclusion, at least three sites appear to be mortuary spaces: La Ferrasie, La Quina and Amud. This suggests the existence of mortuary spaces, places associated with death and appropriate for burial, among at least some Neanderthal populations.

The existence of mortuary space demonstrates modernity in Neanderthal behaviour. In addition, it implies that mortuary behaviour emerged gradually and existed in elaborate ways in other species than ours.

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Appendices

Appendix Table 1: General overview burials

Site						
General			Multiple burial	Temporal restriction		
Name	Type	Cluster	Nr of individuals	Dating	Dating range	Occupation
La Ferrassie	Shelter	West	7	60-70 ka	Unkown	Unknown
La Ferrassie	Shelter	West	7	60-70 ka	Unkown	Unknown
La Ferrassie	Shelter	West	7	60-70 ka	Unkown	Unknown
La Ferrassie	Shelter	West	7	60-70 ka	Unkown	Unknown
La Ferrassie	Shelter	West	7	60-70 ka	Unkown	Unknown
La Ferrassie	Shelter	West	7	60-70 ka	Unkown	Unknown
La Ferrassie	Shelter	West	7	60-70 ka	Unkown	Unknown
La Quina	Shelter	West	20 (to 27)	40-65 ka	Unkown	Yes, several
La Quina	Shelter	West	20 (to 27)	40-65 ka	Unkown	Yes, several
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Amud	Cave	East	16 (to 18)	42-49, 50-60	Unkown	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Shanidar	Cave	East	9	50-60, 60-80 ka	max 10-20.000 y	Yes, two concentrations
Krapina	Shelter	None	23 (to 82)	130 ka	max 8.000 y	Yes, two concentration

Individual	Context		
	Protection		
	Pit	Structure	Location
LF 1	Yes	Stones in pit	Wall, west corner
LF 2	No	No	Wall, west corner
LF 3	Yes	Pit filled with stones	Central
LF 4b	Yes	Pit filled with stones	Central
LF 5	Perhaps	Depression	Wall, near entrance, edge of sediment mounds
LF 6	Yes	Triangular pit within depression, covered with stones	Centre, east corner, bowl-shaped depressions
LF 8	Perhaps	Depression	Wall, near entrance, edge of sediment mounds
H5	No	No	Near or in river
various	Yes, one	No	Unknown
Amud 1	No	No	Wall, northwest part, under drip line
Amud 2	No	No	Wall, northwest part
Amud 3	No	No	Wall, northwest part
Amud 4	No	No	Wall, northwest part
Amud 5	No	No	Wall, northwest part
Amud 6	No	No	Wall, northwest part
Amud 7	No	Niche of wall	Wall, northwest part
Amud 8	No	No	Wall, northwest part
Amud 9	No	No	Wall, northwest part
Amud 10	No	No	Wall, northwest part
Amud 11	No	No	Wall, northwest part
Amud 12	No	No	Wall, northwest part
Amud 13	No	No	Wall, northwest part
Amud 14	No	No	Wall, northwest part
Amud 15	No	No	Wall, northwest part
Amud 16	No	No	Wall, northwest part
Amud 17	No	No	Wall, northwest part
Amud 18	No	No	Wall, northwest part
Shanidar 1	No	Yes, stones	Unknown
Shanidar 2	No	Yes, head on a stone	Unknown
Shanidar 3	No	Yes, stones	Unknown
Shanidar 4	No	Yes, stones	Central, (same spot as 6, 8 and 9)
Shanidar 5	No	Yes, stones	Unknown
Shanidar 6	Unknown	No	Central, (same spot as 4, 8 and 9)
Shanidar 7	Unknown	No	Unknown
Shanidar 8	No	No	Central, (same spot as 4, 6 and 9)
Shanidar 9	Unknown	No	Central, (same spot as 4, 6 and 8)
various	Unknown	Unknown	Unknown

Human remains (I)						
Protection				Processing	Identification	
Completeness	**Preservation**	**Articulation**	**Animal damage**	**Cut marks**	**Sex**	**Age**
Full	Good	Well	No	No	Male	Male, 40-50
Full	Good	Well	No	No	Female	Adult, 25-30
Partial	Good	Unknown	No	No	Undeterminable	Subadult, 10
Full	Good	Unknown	No	No	Undeterminable	Subadult, neonate
Partial	Partial	Unknown	No	No	Undeterminable	Subadult, foetus
Partial	Partial	Well	No	No	Undeterminable	Subadult, 3
Partial	Partial	Well	No	No	Undeterminable	Subadult, 2
Full	Good	Well	No	No	Unknown	Adult?
Poor	Poor	No	No	Yes	Unknown	Unknown
Full	Poor	Unknown	No	No	Unknown	Adult
Poor	Good	No	No	No	Unknown	Adult
Partial	Unknown	Unknown	No	No	Unknown	Subadult, 4
Poor	Unknown	Unknown	No	No	Unknown	Subadult, 3
Partial	Unknown	Unknown	No	No	Unknown	Subadult 6-9 months
Complete	Unknown	Unknown	No	No	Unknown	Subadult, neonate
Full	Good	Well	No	No	Unknown	Subadult, 10 months
Partial	Partial	Well	No	No	Unknown	Subadult, 8
Partial	Unknown	Unknown	No	No	Unknown	Adult
Poor	Unknown	Unknown	No	No	Unknown	Subadult, infant
Poor	Unknown	Unknown	No	No	Unknown	Subadult, 7
Poor	Unknown	Unknown	No	No	Unknown	Subadult, infant
Poor	Unknown	Unknown	No	No	Unknown	Adult
Poor	Unknown	Unknown	No	No	Unknown	Adult
Poor	Unknown	Unknown	No	No	Unknown	Subadult, infant
Poor	Unknown	Unknown	No	No	Unknown	Subadult, 18 months
Poor	Unknown	Unknown	No	No	Unknown	Adult
Poor	Unknown	Unknown	No	No	Unknown	Subadult, infant
Full	Good	Partial	Missing bones	No	Male	Adult, 30-40
Partial	Partial	Partial	No	No	Male	Adult, 20-30
Partial	Partial	Well	No	No	Male	Adult, 40
Full	Good	Well	No	No	Male	Adult, 30
Full	Good	Well	No	No	Male	Adult
Partial	Unkown	No	No	No	Female	Adult
Partial	Poor	Well	No	No	Undeterminable	Subadult, 9 months
Partial	Well	No	No	No	Female	Adult
Poor	Poor	Unkown	No	No	Undeterminable	Subadult, infant
Unknown	Unknown	No	No	Yes, ritual	Unknown	Unknown

Human remains (II)			Other remains			
Anatomical position						
Deliberate posture	Grouping	Orientation	Flint	Fire	Fauna	Flora
Yes	Yes, LF 2	EW / WE	No	No	Yes	No
Yes	Yes, LF 1	WE / EW	No	No	No	No
No	Yes, LF 4b	EW	Yes	No	Yes	No
No	Yes, LF 3	EW	Yes	No	Yes	No
No	Yes, LF 8	EW	Yes	No	No	No
No	No	EW	Yes	No	No	No
No	Yes, LF 5	EW	No	No	No	No
Perhaps	No	Unknown	Yes	No	No	No
No	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	Yes	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Unknown	Unknown	Unknown	No	No	No	No
Yes	Unknown	EW	Yes	Yes	Yes	No
No	Unknown	Unknown	Yes	No	Yes	No
Yes	Unknown	EW	Yes	Yes	Yes	No
Yes	Unknown	SN	Yes	No	Yes	Yes
Yes	Unknown	NS	Yes	No	Yes	No
Yes	Unknown	NS	Yes	No	Yes	No
Yes	Unknown	NS	Yes	No	Yes	No
No	Unknown	Unkown	Yes	No	Yes	No
No	Unknown	Unkown	Yes	No	Yes	No
Unknown	Unknown	No	Yes	Yes	Yes	Yes