

CHAPTER 2

Material Evidence: caring for adult vulnerabilities

Abstract

What can archaeological evidence contribute to our understanding of the origins of human empathy, compassion and generosity?

We have seen in Chapter 1 that our human capacity for compassion and our tendencies to help others have an important evolved biological basis. Here, we focus on what the preserved material evidence of early humans and their behaviours can contribute to our understanding of how our emotional motivations to help others emerged. We particularly consider often-overlooked archaeological evidence for care for adults made vulnerable by illness or injury. This evidence demonstrates a deep past to human emotional motivations to help those around them. Furthermore, changing emotional motivations are a response to wider context and selective pressures, similar to those also seen in some other social mammals. A critical appraisal of evidence for responses to illness and injury suggest that significant changes in helping behaviour and responses to vulnerability may

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have taken place around 2 million to 1.5 million years ago – around the time of key ecological changes and a transition to a new hunting niche. Responses to vulnerability and motivations to help may have been a central element to cognitive-emotional changes that set humans on a track that is distinctive and much more interdependent than that of other apes. Considering the archaeological evidence for care allows us to add a time depth and an explanation for the model of changes in cognitive and affective empathy outlined in Chapter 1.

An understanding of the potential significance of care prompts further questions, such as around different evolutionary pathways in emotional motivations, the relationship between biology and culture in care for illness and injury, the extent of human dependence on such care, and its significance in terms of extended lifespans. Nonetheless, it is clear that an extension of human empathy, compassion and generosity from at least 2 million years ago played a much more significant role in our evolutionary origins than is usually accepted, prompting us to reconsider the driving factors leading to human evolutionary success.

Following on from the significance of interdependence, we consider the formation of relationships based on emotional commitments and trust, and the increasing importance of social reputation, in Chapter 3.



Figure 2.1: Left: Shanidar 1. Osama Shukir Muhammed Amin FRCP(Glasg), CC BY-SA 4.0, via Wikimedia Commons: https://en.wikipedia.org/wiki/Shanidar_Cave#/media/File:Shanidar_I_skull_and_skeleton,_c._60,000_to_45,000_BCE._Iraq_Museum.jpg. Right: Reconstruction of a Neanderthal male. Neanderthal Museum, Mettmann, CC BY-SA 4.0, via Wikimedia Commons: https://commons.wikimedia.org/wiki/File:Homo_sapiens_neanderthalensis-Mr._N.jpg.

Introduction

Our image of our distant past often tends to be rather a brutish one. Even if we no longer imagine thuggish cavemen wielding clubs and surrounded by dinosaurs, we certainly assume that our distant past was a battle for survival in which there was no time for ill health, and few people were in any way kind.

The archaeological evidence does not support this image. In fact, it paints a very different picture. Whilst the infectious diseases that plague large and settled communities were rare, people throughout the Palaeolithic period (from the time of the earliest recovered stone tools, over 3 million years ago, to the end of the last ice age around 10,000 years ago) frequently suffered general wear and tear on bones and muscles, as well as injuries sustained hunting and gathering resources. Most skeletal material from that period shows signs that people were commonly living with the effects of illness and injuries. However, recovery from even severe injuries or illness, or at least survival despite them, was common, suggesting willing care from

others for adults who could not care for themselves. This different picture may help to reframe our ancestors as interdependent, and often vulnerable, people whose emotional connections to each other were key to their shared survival.

One famous skeleton, found in Shanidar cave in Iraq, illustrates particularly well the extent to which evidence for caring behaviours has changed our assumptions about the character of our ancestors. This particular skeleton, Shanidar 1, or 'Ned', has been the subject of much debate about the emotional dispositions of Neanderthals (*Homo sapiens neanderthalensis*) and the extent to which they were kind or callous (see Figure 2.1).

Ned had certainly had a very rough life. He lived around 45,000–70,000 years ago and survived a remarkable level of injury and impairment. His bones were excavated between 1957 and 1961, and demonstrated many different injuries. Probably, as a young adult, he had suffered a blow to the left side of his face, resulting in blindness or only partial sight in one eye. He also had a hearing impairment; a withered right arm, the lower part of which had been lost after a fracture, and possible paralysis; deformities in his foot and leg, leading to a painful limp; and advanced degenerative joint disease (Crubézy and Trinkaus 1992: 411–12; Kent 2017; Trinkaus 1983; Trinkaus and Villotte 2017; Trinkaus and Zimmerman 1982: 61–62). How he suffered his eye-watering range of injuries is not entirely clear, though there has been speculation that he may have been injured in a rock fall.

What was remarkable about this individual was not his injuries themselves but the length of time over which he had survived despite them. He had been injured at least 10 to 15 years before his death, with the curvature of his right leg compensating for injuries to the left (Trinkaus and Zimmerman 1982: 67–68). Yet Ned lived until he was aged between 35 and 50, relatively old for a Neanderthal, despite his range of debilitating impairments. These restricted mobility, ability to perform manual tasks, and perception (Spikins et al. 2018). Sölecki (1971), and later Trinkaus and Shipman (1993), argued that he could not have survived without daily provision of food and assistance. Trinkaus and Zimmerman even commented (1982: 75) that Neanderthals 'had achieved a level of societal development in which disabled individuals were well cared for by other members of the social group'. Aside



from Ned himself, there are many other cases suggesting care against the odds. We now have a wealth of evidence for Neanderthal care, with more than 20 cases of probable care for illness or injury recorded (Spikins et al. 2019). In many, it is clear from the severity of illness or injury and evident lack of possibility of recovery that only genuine caring motivations rather than any calculated reasons explain the help the injured received (Spikins et al. 2018).

After his treatment in life, Ned was also carefully buried after death. He was one of many Neanderthals who were either buried or given a specific mortuary treatment (such as disposal in pits or clefts) at death (Pettitt 2013), the meaning of which remains a topic of much debate (Pomeroy et al. 2020).

Ned seems to provide almost incontrovertible evidence for the emotional motivations of Neanderthals, who seem to have cared deeply for their group members. His care must have been quite extensive, possibly requiring help beyond simple provision of food and water, and perhaps also including aid to keep up with the highly mobile lifestyle of his fellows. The combination of our image of Neanderthals as thuggish with our assumptions about a competitive and individualistic past constrained academic willingness to accept the evidence from Ned, and from other examples, of apparently extensive care, however. His extensive care seemed to contrast with every assumption about our human past as being individualistic and competitive. Davies and Underdown (2006: 148–49) commented that ‘the extensive intragroup care needed to sustain such infirm members is surprising unless they provided some valuable service’. Such evidence, portraying Neanderthals in a very different light from traditional tendencies to see them as some kind of brutish ‘other’ (Madison 2020; Wragg Sykes 2020), has only recently been widely accepted. As we shall see in this chapter, its implications for our evolutionary origins have not yet been fully discussed.

Building on Chapter 1, in which we identified important transformations in human emotional connections, and in compassion and generosity, in the last few million years of human evolution, here we consider what the material record might contribute to our understanding of when and how these changes took place. Further, we consider the implications of these changes for our understanding of the role of care for the vulnerable in our human origins.

Archaeological evidence for the emergence of human compassion and generosity

The material record of past behaviour, and the chronology it provides about changes in human behaviours, emotions and motivations, rarely plays much of a role in discussions about how our emotional minds evolved. It is common to simply draw an imagined line between our nearest relatives, chimpanzees, and ourselves and imagine that the emotional and cognitive abilities of hominins must have lain somewhere along a path between the two. This can be misleading, giving a false impression of human evolution as a progressive advancement rather than a series of pathways and options (as we discussed in the introduction to the volume), and preventing us from appreciating some of the similarities in emotional connections that we share with often distantly related animals.

The archaeological record may provide important insights into the key changes taking place in compassion, generosity and helping behaviours in the 7 to 8 million years that separate our common ancestor from ourselves. The most useful source of evidence is, perhaps, the skeletal evidence of survival from illness and injury, like that demonstrated by Ned (described above), and what this implies about the changing nature of care individuals received from others. However, making sense of this record is not necessarily straightforward and demands critically appraising alternative explanations for recovery from illness and injury, developing an understanding not from any one single case but from the pattern of cases, and considering the ecological and social context and other evidence for responses to vulnerability.

Taking these provisos on board, we nonetheless see a more extensive care for others than we may have imagined. Moreover, this material record is important, as it gives us an opportunity to better understand changes that have taken place since our last common ancestor with other apes, and how these changes relate to distinctively human capacities for affective and cognitive empathy we considered in Chapter 1. At the simplest level, the material record suggests a progression through time from the earliest possible cases of care for the vulnerable, which represent early developments in cognitive and affective empathy, to both a greater frequency of care and a more complex relationship between intuitive responses, long-term planning and



cultural traditions. Care for illness and injury may have been both more economically and more socially significant than we tend to imagine.

These developments are reviewed and discussed from the earliest stages of the earliest beginnings of care to evidence for care around the time of the emergence of 'humans' (early members of the genus *Homo*) to later periods of human evolution incorporating archaic and modern humans.

Before two million years ago: earliest beginnings?

Some of the earliest evidence for possible care for illness and injury come from pre-human contexts over 2 million years ago. Evidence from our hominin ancestors (members of 'tribe' Hominini, or extinct and modern species of humans and pre-human ancestors) suggests that, even as early as 3 to 4 million years ago, australopithecines were already becoming notably social in their orientation compared to their nearest relatives. Canine size, often an indication of the extent of male aggression, is much reduced in *Ardipithecus*, for example (Hare 2017). There is also some evidence, albeit contentious, that sexual dimorphism, another measure of male aggression, had also reduced (Plavcan 2012; Plavcan et al. 2005). An increasing need to collaborate to defend against predators may have been a key selection pressure, making it more advantageous to help others than to hinder them (discussed in Chapter 1).

The earliest potential example of helping behaviour for injured or diseased individuals comes from skeletal remains of two australopithecines found in South Africa. The first case is that of a probable *Australopithecus africanus* from Sterkfontein in South Africa (Stw 363), dated to around 2 to 2.5 million years ago (Pickering and Kramers 2010). Remains of the foot bones of this hominin show damage to the foot (compression fracture of the calcaneus, with the talus driven into the upper surface of the calcaneus), which is likely to have led to severely impaired mobility for at least six weeks after the break (Fisk and Macho 1992). The second case, an *Australopithecus sediba* boy (around 12 to 13 years old) from Malapa (MH1), dating to around 2 million years ago, showed evidence of a bony tumour of the spine (a primary osteogenic tumour, which affected the right lamina of the sixth thoracic vertebra). This tumour is likely to have limited movement of the shoulder and upper right part of the back, as well as causing chronic pain



Figure 2.2: *Australopithecus sediba*. Reconstruction of *Australopithecus sediba*. Copyright Neanderthal Museum, Holger Neumann.

and muscle spasm (Randolph-Quinney et al. 2016). Given the continued arboreal component of mobility in *Australopithecus sediba*, this is likely to have limited mobility. Both cases may suggest some element of at least food provision given continued survival with the conditions. Figure 2.2 shows a reconstruction of this hominin.

These earliest cases of potential evidence for helping the ill or injured individuals suggest a notable survival despite injury that would affect mobility for at least several weeks if not months. Clearly, severe injuries and illnesses that affect mobility make it difficult not only to move to find food but also to find water, and to defend oneself or escape from predators.

There are, however, debates over how to interpret such finds. The extent to which survival despite injury or impairment can *confidently* be interpreted as implying help from others rests on the *implications* of impairments for assistance from others or, conversely, whether these individuals could have survived independently (for a detailed discussion, see Tilley 2015b). In many ways, in making inferences about the likelihood that any individual would have been cared for, we are dealing with a balance of probabilities with



different factors to take into account. The injuries themselves are implied from skeletal material, with a certain degree of uncertainty, and their implications for impairment can vary according to the individual, and within a context in which our understanding of the physiology and anatomy of past hominins is far less developed than it is for modern humans. Their interpretation demands a fuller consideration than it might get if we were dealing with modern peoples.

Doubts about implications?

An important part of the debate over how to interpret the significance of injuries in past hominins in terms of helping from others has been analogies with injuries in other primates. In cases of limb and spine injuries, such as those of the australopithecines described above, it has been argued that even serious injury may not necessarily imply care, since there are cases of modern primates who appear to have been able to survive severe injuries unaided (Dettwyler 1991). If the australopithecines were able to survive unaided, despite injuries that we would usually expect to demand care, then the potential evidence for helping behaviour would be cast into doubt.

Certainly, modern primate populations can often include individuals with limb impairments still managing to forage independently (Munn 2006). Turner et al. (2012) noted, for example, that female Japanese macaques with limb deformities at Awajishima Monkey Centre, Japan, were equally able to climb trees or groom others through compensating with posture or use of other limbs. Individual accounts, such as that of a one-armed gibbon still able to brachiate (swing between the trees) effectively (Sayer, Whitham, and Margulis 2007), also point to remarkable abilities to adapt to limb impairments.

The existence of primates surviving limb injuries may appear to suggest remarkable individual resilience without care. However, there are several reasons why such studies of non-human primates may not be relevant analogies for the impact of past hominin injury on survival.

Perhaps the first, and most obvious, is that non-human primates have a far greater resilience to limb (and back) injury than do our own bipedal ancestors, as their hands and feet can be co-opted to support mobility or manipulation, depending on which limb is damaged. The one-armed gibbon

(above), who was able to brachiate effectively, did so by using their lower limb 'instead of' one arm. There are cases of chimpanzee populations, for example, where up to 20% of individuals have survived a serious injury and manage to cope with injured limbs (Munn 2006). However, these are unusual extremes. Moreover, their use of a hind limb to compensate for loss of use of a forelimb, or vice versa, plays a key role in their adaptations, a luxury not available to bipedal hominins.

The types and rates of injury in modern primates are not a good analogy for early hominins either. Particularly high rates of injury typically relate to unusually high rates of intra group violence in common chimpanzees, which are unknown in other primates, as well as being much higher than in modern hunter-gatherers (Wrangham, Wilson, and Muller 2006). Thirteen of 20 individuals from chimpanzee populations at Kanyawara and Ngogo showed healed trauma, for example. However, this is largely due to bites from intraspecific aggression (Carter et al. 2008). Anthropogenically induced injuries through traps and snares are also common in non-human primates (Stokes and Byrne 2006), as well as those caused by introduced diseases. In wild primates in general, injury rates of around 1% are more typical (Turner et al. 2012).

A further confounding factor is that many primate comparisons come from zoos or provisioned wild populations. Turner, for example, documented notable survival despite disability in a provisioned population of macaques (Turner et al. 2014). However, whilst these individuals may cope despite disabilities, impairments in populations who are *not* provisioned by humans are known to have a notable effect on their risk of mortality. Disabilities that slow foraging can reduce food intake at times of resource stress and affect time available for social grooming (Turner et al. 2014). Deformations affecting symmetry can alter the pace of injured animals. Furthermore, general deformations potentially increase mortality risk from climbing (Turner et al. 2012), added to which, predators will actively target injured individuals who are less able to escape.

Trinkaas and Villotte (2017) concluded that comparisons with the level of independence, despite injury of primates such as those in zoos and those who are provisioned by humans, underestimates the impact of injury and impairment on survival unaided in the wild. An image from modern primates of common, severe injury being survived without care in early



hominis is not supportable. Focusing on adaptations to impairments in otherwise healthy individuals also overlooks the issue that perhaps the most significant effect of injury is in the risk of mortality during a period of incapacitation, rather than how individuals cope *after* healing has taken place. For hominins, being incapacitated for a notable period, under a threat of predation and unable to find food and water, would have been likely to be life-threatening without help. Even severe restrictions on mobility are likely to have brought considerable risk of mortality in a context of high predation and limited adaptability of forelimbs to improve mobility.

The nature of helping in australopithecines

Given the injuries, it is *probable* that some level of helping, at least with food resources and potentially protection from predation, seems likely in the case of Stw 363, who would have had difficulty walking for at least six weeks, and quite possibly also in the case of MH1.

There are a number of reasons why it may have begun to make sense for australopithecines to be motivated to help each other. Though there were various different species of australopithecines, they all were small (around 1.2 to 1.5 m high) and bipedal, making them rather defenceless, living in a more open habitat than their ancestral forest-dwelling relatives. Though bipedal, they still retained a capacity to hang from trees (as shown by their curved fingers). The earliest stone tools, dating to around 3.3 million years ago (Harmand et al. 2015), as well as cut-marked bones from a similar time period (McPherron et al. 2010), show that australopithecines probably used such tools to scavenge meat, sinews or marrow from animal carcasses. Exploiting carcasses would have put them in confrontation with dangerous predators, placing selective pressures on means to defend themselves as a group, and thus on collaboration, communication and prosociality (Bickerton and Szathmáry 2011).

The *cognitive complexity* of helping implied by either of the australopithecine cases need not necessarily have exceeded the complexity seen in other apes, however. Neither of the australopithecines was fully incapacitated and they were thus likely to be capable of reaching a water source unaided (even if more slowly). Most significantly, they were capable of requesting food. Food begged from others, or provisioning by kin, could have been enough

COGNITIVE EMPATHY

AFFECTIVE EMPATHY



Figure 2.3: Possible implications of the material evidence for care for levels of cognitive and affective empathy shown in australopithecines. Penny Spikins, CC BY-NC 4.0.

to keep these hominins alive for some time. Nonetheless, willingness to undertake more costly helping behaviour than we have seen in non-human primates by around 2 million years ago may nonetheless be an indication of changes in affective empathy to include adult group members, and have been important in how empathy and social relationships developed in later hominins; see Figure 2.3.

After two million years ago: the emergence of ‘humans’

Ecological contexts may have been playing a role in increasing interdependence and, with it, probable selection pressures on affective empathy (described in Chapter 1), around the time when the earliest ‘humans’ emerged.

As environments became increasingly variable and heterogeneous, between about 3 million and 1.8 million years ago (Potts 2012; Potts 2013; Potts and Faith 2015), an opening up of new opportunities, as well as new constraints, seems to have led to a proliferation of different hominin forms. These included the earliest members of the genus *Homo* or ‘human’ species, with at least three species contemporaneous around 2 to 1.5 million years ago (Antón, Potts, and Aiello 2014), as well as other contemporary non-*Homo* species. It is difficult to know how the adaptations of any of these different species differ from each other. Nonetheless, many argue that a selection for flexibility and adaptability in response to highly variable environments seems to have been a significant factor in the emergence of a distinct early human cooperative adaptation (Antón, Potts, and Aiello 2014;



Domínguez-Rodrigo et al. 2014; Grove 2011). Environmental variability, resulting in year-to-year, monthly or even shorter-term changes in the types and quantities of resources available, places a particular challenge on survival. As shortfalls in resources become more frequent, increasing any individual's risk of mortality or of failing to reproduce, it makes more and more sense to share resources according to needs (Barkai et al. 2017; Domínguez-Rodrigo et al. 2014; Smith et al. 2012). Seen as one of the most significant periods of transformation in human evolution, biological changes include marked brain expansion, slower maturation and changes in body form that have been interpreted as a response to changes in ecological niche involving a greater dependence on meat eating (Balter et al. 2012; Foley 2016; Roach et al. 2018; Schroeder et al. 2014).

The precise changes and pressures at these key points of transition in human evolution remain debated. Whether ecological changes were *the key prime mover* encouraging hominins to move into an increasingly meat-eating niche, or whether increasing reliance on hunting was in any case a progressive change already taking place within the *Pan*/hominin lineage, or whether it was a rather unique combination of pressures towards interdependence from predation alongside an existing ape social intelligence that led to new types of hominin collaboration, remains unclear. However, there is general agreement that hunting, risk-taking and sharing food underlies this transformation in early members of the genus *Homo*. Changes in emotional relationships, rather than simply cognitive capacities to plan or come to agreements, seem to lie at the heart of these transformations (Hrdy and Burkart 2020; Spikins 2015).

Although attention tends to focus on what are seen as our ancestors, within the earliest members of the genus *Homo* there were other alternative trajectories or other journeys along which alternative ancestors may have travelled. Alternative forms were also around during this period. The robust australopithecines seem, particularly, to have responded to ecological changes by specialising increasingly on the exploitation of plant food, in potentially less risky and more wooded environments (Cerling et al. 2011; Towle, Irish, and De Groote 2017). Their rough diets led robust australopithecines to develop a bony crest to support jaw muscle, huge strongly built jaws and large teeth to process tough vegetation. We can certainly imagine that relying for subsistence on plant materials is likely to have been much less

demanding of social or emotional understanding than relying on meat (the exploitation of which would require working together whether confronting predators or hunting). The buttressing of robust australopithecine faces has even been suggested to be an adaptation to violent confrontations using fists (Carrier and Morgan 2015), though other explanations more rooted in supporting large jaws suggests that this maybe goes a little too far.

As far as early members of the genus *Homo*, or true 'humans', are concerned there is clear material evidence for greater interdependence. The earliest evidence for stone tool use comes from around 3.3 million years ago (Harmand et al. 2015), when stone tools seem to have been used for scavenging meat from bones left by higher-level predators. However, stone tool marks on large animal bones are found from around 2.6 million years ago (Domínguez-Rodrigo et al. 2005) and provide clearer evidence of being used in early access to carcasses. The butchering of small antelopes at Kanjera South in Kenya, around 2 million years ago, has been interpreted as evidence of active hunting (Plummer and Bishop 2016). This hunting of animals larger than the hominins themselves has been seen as good evidence for collaborative hunting and, in turn, the sharing of hunted meat (Domínguez-Rodrigo et al. 2014). By 1.3 million years ago, faunal assemblages at BK at Olduvai suggest active hunting of not only small and medium-sized prey but also large ungulates (Domínguez-Rodrigo et al. 2014). Early humans even hunted extremely dangerous giant gelada baboons at Ologesailie by around half a million years ago (Isaac and Isaac 1977; Shipman et al. 1981). Thus, regular consumption of meat from large mammals has particularly been associated with the emergence of *Homo* (Balter et al. 2012; Pante et al. 2018). Physiological adaptations to increased meat eating were apparent from at least 1.5 million years ago, at least on the basis of the appearance of hyperostosis, indicating anaemia through lack of iron, in a child 1.5 million years old (Domínguez-Rodrigo et al. 2012). Longer periods of infant dependency point to increasingly collaborative childcare alongside other major changes such as brain expansion (Burkart et al. 2014; Hrdy and Burkart 2020).

Evidence for care of the ill and injured

Within this broader picture of sharing, not only of meat but of risks in hunting and time and effort in childcare, we also see emerging evidence for care



for the ill and injured. The earliest potential evidence for extended care in early *Homo* occurs at around 1.8 million years ago. This evidence comes from the survival of a near toothless hominin from Dmanisi in Georgia (D3444/D3900) (Lordkipanidze et al. 2005). The individual had lost all but one tooth (the left canine) several years before death, identifiable through bone resorption. Soft animal foods, such as brain, may have been easier for this individual to eat, and it is thus plausible that others provisioned or even processed (chewed) their food for them. The excavators interpreted this specimen as evidence of care for those who were ill (Lordkipanidze et al. 2005). DeGusta (2002; 2003), however, argued that toothless hominins could have survived by finding their own foods, drawing on evidence for survival in similar cases seen in primates. Certainly, primates with quite severe tooth loss have been recorded surviving, such as a surviving toothless bonobo (Surbeck 2020) or a healthy baboon from Kibale National Park who was missing the premaxilla and most of the maxilla and nasal bones (Struhsaker et al. 2011). This individual, however, possessed third molars, which will have at least made cutting and chewing of food possible. No surviving primate is recorded with the extent of tooth loss seen in the Dmanisi specimen, nor for this lengthy a period (Thorpe 2016). Trinkaus and Villotte (2017) noted that, in several cases, including the Dmanisi individual, tooth loss is accompanied by severe inflammation and periodontal disease. Whilst managing to find sufficient soft food without help for several years despite being unable to chew *may have been possible*, on the basis of analogies with living primates, surviving a period of this type of *systemic illness* is a more reliable indicator of care from others. Individuals in this state will have felt extremely ill and would have been in pain. Toothlessness remains a difficult issue to interpret in terms of care (Gilmore and Weaver 2016); however, the Dmanisi evidence, with systemic infection, can be cautiously interpreted as likely evidence of care from others.

Two particularly convincing examples of care that clearly go beyond that recorded in non-human primates also emerge after 1.8 million years ago, however. Both are from East Africa – an adult female *Homo ergaster* (1808) from Koobi Fora, and a young male *Homo ergaster/Homo erectus* (WT1500) from Nariokotome.

The *Homo ergaster* female from Koobi Fora (Lake Turkana, Kenya) is by far the most famous. Dating to around 1.6 million years ago, this partial skeleton of

a probable *Homo ergaster* was recovered in 1974. The most notable feature of her skeletal remains is a build-up (as much as 7mm in places) of coarse woven bone in the limb bones, with sub-spherical lacunae within this bone accumulation (Walker, Zimmerman, and Leakey 1982: 248). The cause of this pathology has been debated. The effect on the bones is, however, typical of hypervitaminosis. One possibility is that of an excessive consumption of carnivore livers (something experienced by Arctic explorers who resorted to eating their sled dogs) (Walker, Zimmerman, and Leakey 1982), another being an overconsumption of bee brood larvae (Skinner 1991). Hypervitaminosis would have caused this individual to have suffered from health implications including peeling skin, vomiting, diarrhoea, headache, convulsion, oedema, inflammation of the optic nerve, muscular stiffness, itchy rash, and inflammation of the nail beds, as well as periods of unconsciousness and severe pain for several weeks or, perhaps more likely, even months before her death (Skinner 1991; Walker, Zimmerman, and Leakey 1982). She will have been extremely vulnerable throughout this time.

What is clear is that 1808 was unable to find food for herself or defend herself from predators for a substantial period and, for at least some of the time while she was ill, was unlikely to have been able to give clear cues as to her needs. She would, however, have needed providing with food and water and to be protected from predation (Walker, Zimmerman, and Leakey 1982). In cognitive terms, her care is likely to have demanded instrumental helping (of providing a safe place to rest), proactive sharing (of food), as well as responses to unsolicited cues (such as for food and water despite any severe pain, lack of consciousness etc.). Help in this case would have been not only *unsolicited* but also *extensive and costly*, suggesting both more extensive affective empathy (emotional response) and more complex cognitive empathy (higher-level functioning) to infer what help would be needed to keep this individual alive than is seen in any non-human primate.

Care for a young male *Homo erectus/Homo ergaster* (WT 15000 or 'Nariokotome Boy'), dated to 1.6 million years ago from Nariokotome, would also have necessitated complex cognitive and affective empathy. This individual, who was around eight years old at death (Graves et al. 2010), had a herniated disc and suffered extensive remodelling of part of the spine (the articular processes of L4 and L5) several months before their death (Schiess et al. 2014). As a result, he would have suffered from disabling backache



Figure 2.4: *Turkana Boy* (detail). Reconstruction of Nariokotome (Turkana) Boy, typical of a *Homo erectus*/*Homo ergaster*. Copyright Neanderthal Museum, Holger Neuman.

and recurrent sciatica, which would have restricted walking, bending and other daily activities. It is difficult to see how he could have foraged successfully or kept up with a mobile group. Hausler et al. argued that this case also provides evidence for advanced social care and nursing at this time (Hausler, Schiess, and Boeni 2013: 3). Figure 2.4 shows a reconstruction of this individual. An example of possible dental treatment in a further *Homo erectus* individual from Swartkrans in South Africa has also been seen as possible evidence for care from others (Ripamonti et al. 2020).

Extended provisioning of the ill and injured, and unsolicited help, would have been an important element in keeping small collaborative groups of *Homo erectus* viable in conditions with high injury risk, and may even have been a key factor making the colonisation of northern temperate zones possible (Spikins et al. 2019). Control of infectious diseases is unlikely to have been a key factor in the emergence of healthcare practices, given evidence that early hominins lived in small inward-focused social groups (discussed in Chapter 4) and the prevalence of injuries and degenerative rather than infectious diseases in the palaeopathological record. Nonetheless, at

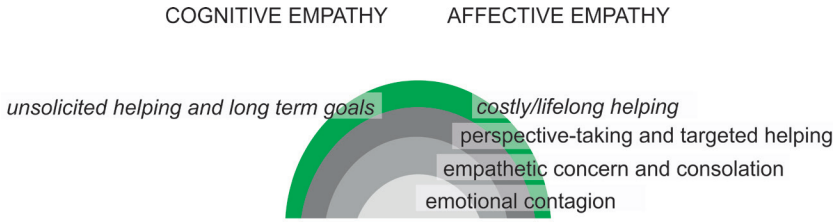


Figure 2.5: Possible implications of the material evidence for care for levels of cognitive and affective empathy shown in early members of the genus *Homo*. Penny Spikins, CC BY-NC 4.0.

a later date, as populations became larger and more connected, care may also have been important in managing infectious diseases (see Kessler 2020; Kessler et al. 2017).

Whether this care represents as complex a level of cognitive or affective empathy as we identified as characteristic of humans today remains a question. We can be confident that early members of the genus *Homo* had some abilities to provide unsolicited help (such as for the female *Homo ergaster*, who will have spent some time unconscious and unable to request help but yet need protection) and towards long-term goals (such as through providing water), and helping is costly, though not lifelong. However, there is as yet little evidence for helping of non-kin or strangers or discriminate helping (Figure 2.5). Of course, such more emotionally extensive and cognitive complex care may have existed at this time but not leave any material evidence.

The significance of even intuitively motivated care, much like that for vulnerable young, is nonetheless clear. We can see how important simple provisioning and protection becomes to survival through considering modern hunting and gathering societies. For modern hunter-gatherers, even with the benefits of a modern mind, reduced risks of predation seen in early humans and complex technologies including projectiles, care for illness and injury is still essential to maintaining survival. Sugiyama (2004) reported that, amongst the Shiwi hunter-gatherers, for example, around 50% of adults had been incapacitated and unable to forage for at least a month, and would not have survived without provisioning and care from others.



Care as part of increasing interdependence

Social transformations around this time have typically been viewed from the perspective of biological changes in the body, or as an example of increased intelligence overall, or social and collaborative intelligence. However, changes in emotional dispositions may have played a key role in how humans affected a transformation from being individuals within a loose group to highly collaborative bands. Individuals who had begun a journey to being more interdependent could now work like a 'single predatory organism' (Whiten and Erdal 2012).

Increased meat consumption provides direct fuel for brain expansion, but changes in emotional dispositions leading to cooperative breeding may also be critical to being able to support ever larger brains by reducing the energetic costs to mothers of raising large-brained infants (Hrdy 2011). This involvement of fathers and others in childcare may have been key to allowing humans to break through a 'grey ceiling' of limits to social and cognitive intelligence that affect other species (Isler and van Schaik 2012).

Through sharing risk, foodstuffs and care via tendencies to mutual generosity, humans will have reduced the risks of individual failure as well as being able to hunt larger game (see Figure 2.6). Moreover, modern foragers both hunt and gather, with the former giving higher returns but the latter being more reliable. Starchy foods, such as tubers, may have played an important complementary role, perhaps as fallback foods (Hardy et al. 2015; Marlowe and Berbesque 2009). A social carnivore-like level of collaboration also provides potential means of adapting to risk in other ways. Hyenas, for example, hunt food and collaborate to defend their group with non-relatives (Schaller and Lowther 1969; Smith et al. 2012), and group sizes can alter according to the season or ecological context. If early humans also lived in flexible groups, this could have been important to adapting to seasonal or longer-term ecological changes. This flexibility of community may have been particularly important as a means by which human communities adapted to ecological changes (Grove, Pearce, and Dunbar 2012).

The care for illness and injury described above is most probably the most archaeologically visible element of extensive emotional motivations to help

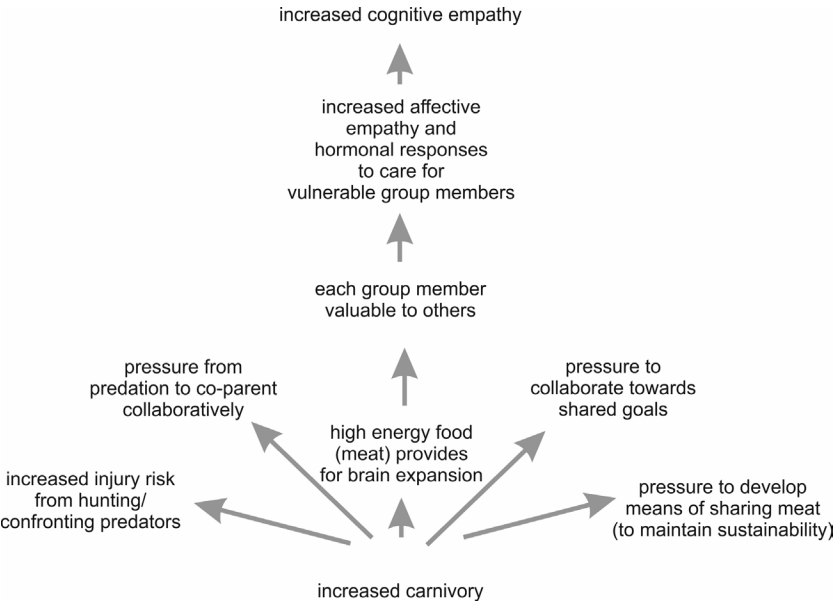


Figure 2.6: Selection pressures on affective and cognitive empathy driven by increased meat eating. Penny Spikins, CC BY-NC 4.0.

others within one's group (Hrdy and Burkart 2020; Spikins 2015). However, interdependence and increasingly strong emotional connections, supported by changes in particular brain regions as well as bonding hormones (discussed in Part 2), will have affected many different behaviours (including the sharing of food, shared care of offspring and collaborative defence and resource gathering; Feldman 2017), much like changes in the helping, sharing and affection that also developed in increasingly interdependent social carnivores.

Support for the primacy of emotional and social changes before other areas of cognition comes from one particularly notable alternative human adaptation. Studies of crania of *Homo naledi*, from the Rising Star Cave system in South Africa (Berger et al. 2015), demonstrate that this species had a complex forebrain, in common with other members of the genus *Homo*. Endocasts showed frontal parts of the brain associated with processing emotions and understanding social relationships such as the pars orbitalis, which involves Brodmann's area 47, associated with the recognition and production of social emotions, social inhibition, and emotional learning (Holloway



et al. 2018: 5741). However, *Homo naledi* had a very small overall brain size, similar to that of the australopithecines. Their emotion processing capacities seem to be ancestral to *Homo* and may explain behaviours such as the deliberate deposition of their dead in the Di Naledi chamber. Emotion processing, rather than brain size, seems to be key, not only to complex social practices such as these but also to some degree of adaptive success, with *Homo naledi* surviving alongside other large-brained hominins until at least 300,000 years ago. The late existence of this small-brained but socially and emotionally complex human is interesting, not only in demonstrating different evolutionary pathways and different ways of being human but also when we consider what it may mean about possible constraints. Whilst *Homo naledi* remained successful despite larger-brained contemporaries, there are, as yet, no known hominins making a living with a large brain but underdeveloped social and emotional processing areas. This may add additional support to the significance of emotional connections, rather than analytical processing capacities, to what made us human. Care for illness and injury may have had other consequences, aside from forming the basis for complex areas of cognition, particularly in its influence on human cultural evolution and our dependence on the cultural transmission of ideas.

After half a million years ago: later periods of human evolution

By around half a million years ago, we see diverse species of humans occupying northern latitudes, including Europe, as well as Africa and Asia. These species were quite different in form. One broad type included humans who were very robust with prominent brow ridges, such as the northern-latitude and Asian group including Neanderthals, Denisovans or *Homo longi*. Another broad type was of much smaller- and small-brained humans, such as *Homo floresiensis* or *Homo naledi*. A third type of humans, appearing in Africa from 300,000 years ago, were more gracile, with reduced brow ridges. The latter, gracile type includes the ancestors of our own species. Despite their differences, interbreeding occurred between these different forms and all are generically termed archaic or pre-archaic *Homo* or Middle Pleistocene *Homo*, though, as we shall see in Part 2, some differences between these types may be significant in terms of tolerance and emotional sensitivity. It is in this period that we see the earliest evidence for long-term commitments from the group as a whole, suggesting a sense of collaborative investment

in care, as well as uncalculated care for even the most severe of injuries and illnesses.

At Sima de los Huesos in northern Spain, at least three of the around 28 individuals of pre-archaic/Neanderthal populations deposited in a mortuary pit appear to have been supported through particular pathologies (Carbonell and Mosquera 2006). The best-known of these cases of extended care, that of an eight-year-old child with craniosynostosis, a torsioning of the crania, is perhaps not particularly surprising (Gracia et al. 2009). Maternal care for infants, even those who are ill or different, is recorded in apes, such as an infant chimpanzee with Down's syndrome in Mahale Mountains National Park, who was carefully looked after by their mother (Matsumoto et al. 2016). Moreover, craniosynostosis does not always have noticeable cognitive implications. However, the continued survival for several years of a different individual, an elderly man with a deformed pelvis who would only have been able to walk with the aid of a stick (Bonmatí et al. 2010; Bonmatí et al. 2011), does point towards support of the vulnerable, regardless of whether they could contribute in an economic sense. A further hominin with possible hearing impairment (Trinkaus and Villotte 2017) is at least suggestive of a certain level of accommodation for difference.

It is, however, in descendants of the Sima de los Huesos populations that we see the most widespread evidence for extended care (see Figure 2.7). Neanderthal populations, the occupants of Europe from around 300,000 to 30,000 years ago, who are discussed in more depth in Chapter 8, provide us with many notable examples of care for the ill and injured.

Life was most certainly challenging for these populations. Famines were not uncommon and, in the often cold and arid environments in which they lived, finding food seems to have demanded high levels of mobility, with resultant stress on their bones. Though it is difficult to interpret injury rates precisely, given the nature of the archaeological record, it seems from the skeletal material available to us that illnesses and injuries appear to have been frequent, with most Neanderthals suffering a severe injury of some kind before they reach adulthood (Berger and Trinkaus 1995; Pettitt 2000). Healthcare may have been part of the adaptations that allowed occupation in such difficult conditions, particularly given a heavy reliance on hunted



Figure 2.7: *Homo sapiens neanderthalensis*. Reconstruction of a Neanderthal. Copyright Neanderthal Museum, Holger Neumann.

meat and small group sizes, all of which will have made the survival of each person significant to the whole group (Spikins et al. 2018).

Shanidar 1 was not alone in surviving severe injury and lasting impairment. An individual from La Chapelle-aux-Saints was also cared for despite a range of impairments and, perhaps most importantly, with no real hope of recovery (Bouyssonie, Bouyssonie, and Bardon 1908; Dawson and Trinkaus 1997; Trinkaus 1985), later being carefully buried (Dibble et al. 2015; Rendu et al. 2014; Rendu et al. 2016); see Figure 2.8. Tilley (2015a) described his pathologies in detail, including extensive tooth loss and severe, chronic periodontal disease; temporomandibular joint arthritis; severe osteoarthritis in lower cervical and upper thoracic vertebrae, and moderate to severe degeneration of lower thoracic vertebrae; osteoarthritis in both shoulder joints; a rib fracture in the mid-thoracic region; degeneration in the fifth proximal interphalangeal joint of the right foot; and severe degeneration and likely chronic osteomyelitis in the left hip (Tilley 2015b: 228). Most particularly, degenerative disease in the spine and shoulders would have affected his upper body movement, whilst his diseased left hip would have imposed



Figure 2.8: The La Chapelle-aux-Saints Neanderthal burial. Musée de La Chapelle-aux-Saints, Corrèze, France. 120/V. Mourre, CC BY-SA 3.0, via Wikimedia Commons: https://commons.wikimedia.org/wiki/File:Reconstitution_sepulture_Chapelle-aux-Saints.jpg.

significant pain and restricted the use of his left leg to bear weight. Underlying infection, both localised and systemic, would also have taken a progressive toll on his health and strength over the last year of his life. We can only imagine how ill and vulnerable he must have felt.

Both La Chapelle-aux-Saints 1 and Shanidar 1 would have been unlikely to have survived lengthy and severe impairments without involvement from the whole group in their care. Moreover, given that improvements would evidently have been unlikely, such care must have been uncalculated. Even provisioning a single individual who was immobile, or with severely impaired mobility, for a short time would have been difficult. However, the extended provisioning and care in place (which in the case of La Chapelle-aux-Saints 1 can best be described as nursing) would also have demanded a sharing of responsibility. That care was uncalculated, irrespective of whether these individuals would recover or ever return the investment in them, is evident, changing many of our preconceptions of Neanderthals.



Other cases of serious injury, such as fractures of weight bearing bones, are also likely to imply a period of provisioning. La Ferrassie 1 (Tilley 2015a) and Tabun 1 (Abbott, Trinkaus, and Burr 1996) have recovered from severe breaks to their main leg bones, for example, and Shanidar 3 a break or sprain of the right foot leading to marked osteoarthritis (Trinkaus 1983). La Ferrassie 2, a young female adult buried in close proximity to La Ferrassie 1, displayed evidence of a proximal fracture of the right fibula that is completely healed, although with significant distortion (Heim 1976). Wynn and Coolidge (2011) argued that those with lower leg injuries ought to have been too much of a burden to sustain and may have been abandoned, and Berger and Trinkaus (1995: 138) commented that ‘abandonment of older individuals who could no longer move with the social group is likely to have been common. This would have occurred especially in cases of severe lower limb injury’. The healed injuries in these individuals point in contrast, however, to care *despite* immobility. It is possible that human populations routinely adapted their mobility patterns around the need to leave the vulnerable or young to be cared for in particular locations. It has been argued that Wonderwerk cave in South Africa could be one such location. This cave was apparently used extensively for shelter, with evidence for the use of fire without any intensive use of stone tools (Chazan 2021).

Might immobile individuals, or those with restricted mobility, have been able to contribute to tasks suitable to their abilities? This would have been unlikely in cases of severe pain or systemic infection. However, in other cases we might expect some activities to be possible. We do not know whether Neanderthals felt only certain people could perform particular tasks. Some authors have argued for a lack of gender-based division of labour in Neanderthals (Balme and Bowdler 2006; Kuhn et al. 2006). However, recent evidence from dental microwear suggests that at three sites, l’Hortus (France), Spy (Belgium), and El Sidrón (Spain), females were chewing different materials, perhaps indicating preparation of hides (Estalrich and Rosas 2015). Even so, cold, arid and high-latitude environments demand substantial time investments in making all the kinds of things that are needed to survive (Bleed 1986), and, whether this is the manufacture of clothing or tools, there will have been sedentary occupations providing possibilities for those with limited mobility to contribute. Moreover, groups of Neanderthals will have included within them children, many of them vulnerable and with reduced mobility themselves due to their age. Neanderthal children did not

reach adulthood until approximately similar ages to modern hunter-gatherers (Ponce de León et al. 2016), and at least half of any group was likely to consist of children (Shea 2006). As well as sedentary contributions by making things (such as clothing or tools), opportunities to contribute to child-care are likely to have existed for those who could not travel far. Further, the lengthy period of dependency of Neanderthal children carried other implications for care provision. Rather than any radical change to mobility or provisioning, healthcare for those with reduced mobility may have tapped into existing adaptations to care for vulnerable young.

Even where individuals remained *mobile*, many conditions may have required some care or accommodation. Individuals with breaks to major bones in the arms will also have needed at the very least an accommodation of suitable tasks, for example. The serious arm injuries of Neanderthal 1 (Feldhofer) (Schultz 2006), Krapina 180 (Eddie 2013) and La Quina 5 are likely to have affected their ability to forage independently, for example. As discussed, unlike other primates, humans cannot use either arm or leg as alternative limbs (for weight bearing or manipulation). Other injuries such as the projectile point injury to the ninth rib of Shanidar 3, speculated to be a result of interaction with modern humans (Churchill et al. 2009), will also have affected health and mobility. Furthermore, head injuries can also require care depending on severity. St Césaire 1 (Zollikofer et al. 2002) and Krapina 37 (Russell 1987) suffered severe head wounds that had afterwards healed, in the case of the St Césaire Neanderthal over a period of several weeks.

Toothlessness, as previously discussed, remains a rather more difficult case. Primates with quite severe tooth loss can survive unaided for some time. Nonetheless, Trinkaus argues that it is likely to have had more significant impact, with severe inflammation, as seen in Aubesier 11 and Guattari 1 (Trinkaus and Villotte 2017). Other conditions also had a lifelong effect, like that of an archaic human woman from Salé in Morocco with congenital torticollis who reached adulthood, despite the condition, which is associated with reduction mobility of the neck as well as other debilitating symptoms (Hublin 2009).

The level of care given to those in need, even where there will evidently be no direct 'pay off' (as is the case with Shanidar 1 and La Chapelle 1) argues that care was in no way calculated but a genuine immediate response to



vulnerability. These were likely to be societies with strong bonds based on empathy and high levels of trust, promoting the kind of social and emotional environments that foster a willingness to take risks and costs on others' behalves.

Care amongst Neanderthals also implies a sophisticated level of knowledge and planning. High rates of healing and low rates of infection (Trinkaus and Zimmerman 1982: 75) argue for planned care practices for the injured. Bitter-tasting plants with no nutritional value found in dental calculus provide evidence for possible medical consumption, for example (Hardy 2018; Hardy 2019; Hardy et al. 2012). Poplar in the dental calculus of a Neanderthal with a dental abscess from El Sidrón may have been used as a painkiller as it contains salicylic acid (which acts as a painkiller in aspirin) (Weyrich et al. 2017). Ochre may also have been used as an antiseptic (Velo 1984) and tar may also have been chewed for the same reason, as well as in maintaining the teeth (Aveling and Heron 1999). Toothpicks were also used, in the case of an individual from Cova Foradà in Spain to apparently attempt to treat periodontal disease (Lozano et al. 2013). Medicinal knowledge is likely to have been handed down over generations and culturally variable in different regions. Whilst particular practices of care tend to be culturally specific, a knowledgeable, organised and caring response is typical from archaic humans onwards. Though there is no direct evidence, we reasonably assume that birth assistance was widely practised – Neanderthal babies were born with a modern human pattern of head rotation at birth (Ponce de León et al. 2008), demanding assistance, and birth assistance has even been recorded in bonobos (Demuru, Ferrari, and Palagi 2018).

As we shall see in Part 2 of this volume, there are important differences between societies of archaic humans and the descendants of these populations who left Africa after 100,000 years ago – modern humans, anatomically and cognitively identical to ourselves. Care for the ill and injured, however, shows only subtle differences.

There continue to be examples of uncalculating care for those in need, regardless of any possible direct 'pay off', as well as care that must have been shared between many individuals. The Ohalo 2 individual, from the Upper Palaeolithic of south-west Asia dated to 23,000bp, for example suffered a thoracic injury causing ossification of the sternum and adjacent cartilage. He

would have struggled to have breathed actively, making anything more than very short bursts of activity impossible. Care from the rest of his group would have been likely to have been needed to support him (Trinkaus 2018a). Like other key Upper Palaeolithic examples in Europe, such as Barma Grande 2, Brno 2, Cro-Magnon 1, Dolní Věstonice 15, Rochereil 3, Romito 2, and Sung-hir 2 and 3 (Trinkaus 2018a), his level of survival despite injury or impairment provides good evidence for empathetically motivated care from the small hunting and gathering groups of which these individuals were a part.

Where we see subtle differences is around a certain unusual attention to disability and impairment. Individuals with impairments were apparently selected for particular burial in Upper Palaeolithic Europe (around 30,000 to 10,000 years ago), for example (Formicola 2007). Examples include the Romito child, with dwarfism, buried under a depiction of an aurochs (Mallegni and Fabbri 1995), two juveniles at Sung-hir in Russia, one with severely bowed legs and another with severe facial abnormality (prognathism), interred with elaborate burial goods, including 16 mammoth ivory spears (Trinkaus and Buzhilova 2018), the central individual of an elaborate triple burial at Dolní Věstonice who had severe limb abnormalities (Trinkaus et al. 2001) and a woman from the same site with a facial deformation (buried under the scapula of a mammoth, and covered with red ochre). In the latter case, a figurine with the same facial deformation as the woman was also found from the same site, suggesting that her facial difference made her in some way special.

We can see various types of accommodations for illness or injury in modern hunting and gathering populations. Amongst the modern-day Baka, individuals with severe mobility impairments take on important social roles (Toda 2011). Whilst the differentiation of individuals with disabilities remains enigmatic, it best represents in general terms the significance of *reputation*, with the determination of disabled individuals to overcome adversity gaining them a certain respect.

To some extent, some forms of social differentiation may be apparent in archaic populations, even if less visibly so. We may see a different treatment of different people in Neanderthal populations in mortuary practices, where older males with injuries may be more likely to be buried after death, and in distinctive practices around children, such as the burial of a child with possible grave goods at Dederiyeh in Syria (see Spikins et al. 2014).

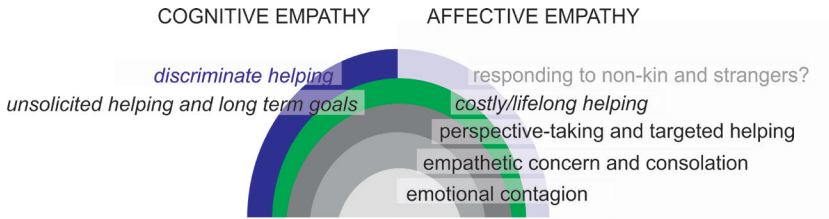


Figure 2.9: Possible implications of the material evidence for care for capacities in cognitive and affective empathy in archaic and modern humans. Penny Spikins, CC BY-NC 4.0.

It is clear that archaic and later humans were capable of complex planning around care, and had the emotional capacities which prompt us *to costly and lifelong acts of care* for those we love (see Figure 2.9). A *different treatment of different people* provides us with evidence of discriminate helping, one of the more complex features of cognitive empathy identified in Chapter 1. The question of an extended affective empathy, prompting an extension of helping to non-kin and strangers familiar to modern societies is, however, almost impossible to identify from survival from illness and injury and is a topic we turn to in Part 2.

It is not difficult to identify a broad pattern of changing responses to vulnerable, ill and injured individuals, from possible early examples, perhaps not dissimilar to those practices seen in other mammals and particular social carnivores, to more widespread, long-term and knowledgeable care later in human evolution. Interpretations of care, and of what behaviours mean in terms of the emotional motivations underlying such care, particularly if we try to focus on individual cases, are not without their issues, however. There have been a number of issues raised with interpretations of care that warrant discussion.

To what extent can archaeological evidence be used to infer key changes in emotional connections and capacities for compassion?

There are several key challenges to address in making inferences from skeletal records of recovery from illness and injury. Firstly, there are many biases affecting the archaeological record that may influence our interpretation. Secondly, there are a number of unknowns. Most particularly, it can be difficult to infer the extent to which any individual may have been able

to survive alone or tolerate particular conditions, particularly when we are dealing with hominins who were anatomically and perhaps even physiologically different from ourselves. Lastly, evidence for helping, particularly in the complex societies of cognitively modern humans, is not always evidence of compassionate motivations – helping can be motivated by calculated intentions rather than genuine empathy or compassion.

The issue of bias is a pervasive one when dealing with archaeological evidence. Only certain types of materials are preserved, under particular conditions and in particular places. Human and animal bones can sometimes be preserved where the conditions are suitable for their preservation. Some of our best-preserved skeletal records come from particular contexts, most notably burial practices, which may not be a representative sample of the people at the time (Spikins et al. 2014; Spikins et al. 2018). Moreover, we can sometimes question the reliability of inferences from a small number of individuals spread out over large areas of time and space. Neither can modern biases be discounted: until recently, fragile infant bones were only rarely recovered on excavations, further biasing the record. Interpretations can never be entirely straightforward.

Inferring implications in terms of care is also difficult. We usually underestimate the prevalence of injuries and illnesses requiring treatment as even quite severe injuries and illnesses often leave no trace on the human bones. In fact, well over 90% treatments for illness or injury in wilderness locations, many of which would have contributed to saving lives, would leave no indications on skeletal evidence (Spikins et al. 2019); see Figure 2.10. Our evidence of illness and injury is thus only a tiny window onto the actual injuries, illnesses and impairments that people experienced in the past.

Whilst the restricted visibility of most pathologies requiring care means that our estimates of care are underestimated, other factors may elevate our impression of the care that was given to particular individuals. It is often difficult to infer exactly the nature of injury or illness. Few skeletal remains from the distant past are complete and most are missing many elements, which makes inferring the implications challenging. Alternative explanations for the pathologies seen in 1808 include yaws (*Treponema pertenu*) (Rothschild, Hershkovitz, and Rothschild 1995) and sickle cell anaemia (Jefferson

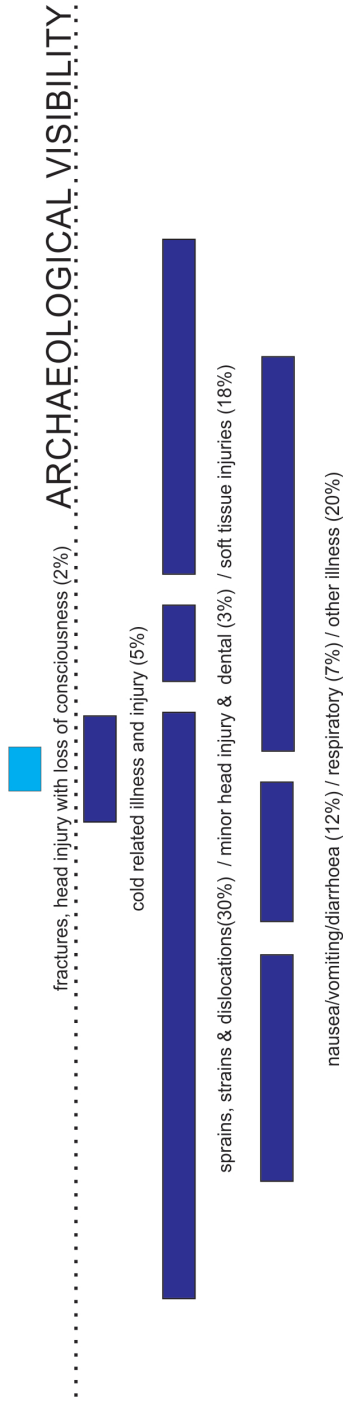


Figure 2.10: Medical treatment in wilderness locations. National Outdoor Leadership school's incidents requiring medical attention in wilderness activities in Wyoming, Alaska, Arizona, Washington, Idaho, Mexico, Chile and the Yukon Territory; 1051 individuals (average age 22 years) 1998–2003. Data from McIntosh et al. 2007. Penny Spikins, CC BY-NC 4.0.

2004), for example, though hypervitaminosis best fits the bone pathology (Dolan 2011). We also have to bear in mind that our modern analogies may not be as relevant for early hominins as we might hope, and individuals in the past may have been more independent than we might give them credit for (Degusta 2002; Dettwyler 1991). Cowgill (Cowgill et al. 2015), for example, noted that a young female buried at Sunghir during the Upper Palaeolithic showed extensive evidence for sustained mobility despite notable bowing of her legs, demonstrating that she kept up with the group despite this impairment. Self-care and self-medication may also be a factor. A *Homo erectus* from Swartkrans with probable intentional removal of an M3 molar that is likely to have been infected and shows subsequent bone regrowth around the side might conceivably have removed this tooth by themselves rather than needing help from others, for example (Ripamonti et al. 2020). These issues mean that the less severe cases of pathology are more debatable in terms of care from others.

Making inferences about emotional motivations from past behaviours, themselves inferred from material evidence, is also subject to a number of challenges.

It is clear that we are all born with a *capacity* for compassion, generosity and a whole range of helping behaviours (as we have seen in Chapter 1), and that helping and provisioning of group members is unsurprising given its appearance in highly independent mammals such as many social carnivores, African painted wolves being a particular case.

A broad capacity for compassion is not, however, enough to infer that this must have been a motivation in the past in any particular instance. A particular challenge to interpretations of archaeological evidence for helping in the past is, however, the *possibility* of particularly human motivations of deception, adherence to norms, or concerns with status rather than genuine empathy (Figure 2.11). Other animals do not deceptively help individuals that they do not care about, nor do they help because of a social or cultural norm, so we reasonably assume that *their* helping reflects an immediate emotional response. Modern humans and by implication potentially earlier species besides are much more complex in their decision-making, however. At one extreme, a response to distress that is *always calculated* (rather than genuine) would be considered a disorder in humans; nonetheless, in large

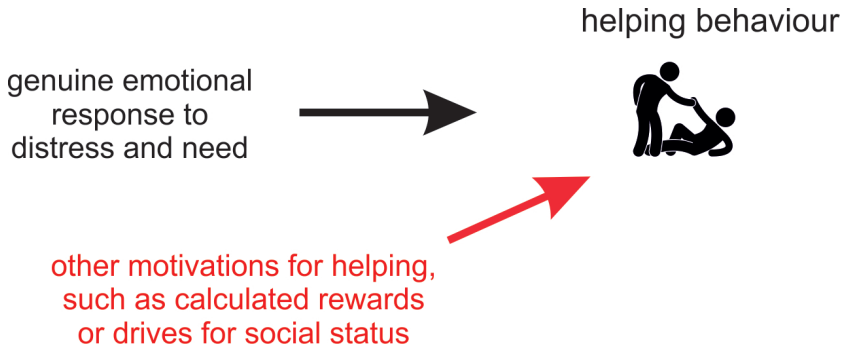


Figure 2.11: Alternative motivations for helping in response to others' needs or distress. Penny Spikins, CC BY-NC 4.0.

human societies where relationships of different kinds are formed with many different people, helping others on a day-to-day level can be motivated by all kinds of complex social factors. These can include motivations such as a desire to improve social standing, or for recognition, as well as calculated self-interest (Böckler, Tusche, and Singer 2016). Moreover, tendencies to compassion can be blocked by stress, depression or anxiety (Gilbert 2005).

In fairness, our experience in modern industrialised societies is not necessarily a good analogy for the past, as small-scale hunting and gathering societies operate far more intimate social relationships where deception or a lack of genuine motivations cannot be 'pulled off' for long (Boehm 2012). Even so, even in such highly intimate contexts there will be occasional deception or self-oriented motivations. Serious selfishness or exploitation is strongly resisted, even to the point of assassination (Boehm 2012). However, in modern hunter-gatherer contexts, many people can 'get away with' a low level of individualistic motivations or deception at certain times. Peterson described, for example, how the Australian Pintupi uphold the common hunter-gatherer ethic of food sharing, yet tolerate a certain level of hiding food to prevent others from asking for it (Peterson 1993). Likewise, Hadza men consume more food away from campsites, where they are not seen, rather than visibly eating something that might be shared (Berbesque et al. 2016). Equally, whilst people may not always *feel like* helping others' infants, sharing food or caring for the ill, unlike other animals we recognise that social reputation is affected by not seeming generous of time or effort. Moreover, even in the most collaborative of setting there will still be some

people whose attachment insecurities will influence how genuinely they are about others' wellbeing. The modern Inuit, for example, acknowledge that orphans tend to be more competitive (and less genuinely motivated by others' needs) than those who have experienced a more secure upbringing (Briggs 1970).

These limitations mean that we can rarely place too much emphasis on any isolated example of helping behaviour. Broader patterns remain reliable, nonetheless. Genuine motivations are far more prevalent than calculated ones, and the most parsimonious (and simplest) explanation is that of an immediate uncalculated response, meaning it is reasonable to infer genuine compassion when we see widespread evidence for care of the injured (Flack and de Waal 2000). This does not mean that there are no exceptions. Capacities to be cunning, deceptive and calculated in response to others' needs clearly evolved in a constant and complex dynamic alongside those to convince others of genuine intentions, to detect deception and to punish cheats (de Quervain et al. 2004); see Chapter 3. These will certainly be present in cognitively modern humans and quite possibly much earlier. Sustained care for others, and other prosocial collaborative behaviours such as widespread food sharing, can only be sustained where the majority of individuals are genuinely altruistic, based on shared emotional responses to those in need (Egas and Riedl 2008). Nonetheless, a certain realism about human nature suggests that some will always be 'cheating' and no one is genuinely compassionate all of the time.

These potential complex variations imply that we should be careful not to make interpretations based on any single instance of probable care, though broad patterns occurring over long periods of time, as outlined above, withstand scrutiny. Moreover, these broad patterns of interdependence and response to vulnerability are reflected in other areas of the archaeological record.

Other realms of material evidence for helping those in need

We have focused here on evidence for care for illness and injury. However, whilst survival from injuries is the most obvious realm of evidence for care and compassion, it also fits within other realms of evidence.



In broad terms, evidence for extended helping of those with illnesses and injuries fits with other lines of evidence for key social changes. These include evidence for extended childhoods, implying collaborative infant care, as well as evidence for the hunting and sharing of large game, requiring collaborative effort. These different elements of responses to needs and vulnerabilities imply emotional attunement, sharing and generosity were emerging as a response to increasing interdependence from at least 2 million years ago (Smith et al. 2012; Whiten and Erdal 2012).

There are also more specific lines of evidence indicating closer emotional relationships and empathetic responses. The most obvious are mortuary practices. There is potentially some evidence of mortuary ritual as early as 3 million years ago, though evidence becomes more frequent after half a million years ago (Pettitt 2013). In some cases, it is hard to avoid the sense of emotional connection in life shown by the care afforded to the deceased. One example of such is the careful burial of a Neanderthal child at Dederiyeh Cave, Syria, with a flint flake carefully placed on their heart and stone above their head, likely as a collective response to a sense of loss (Spikins et al. 2014). As we have seen in Chapter 2, affective empathy for the living is often linked to particular grief-like attitudes at death, shown in species as widely separated as jays (Iglesias, McElreath, and Patricelli 2012), dingoes (Appleby, Smith, and Jones 2013) and chimpanzees (Biro et al. 2010).

A response to vulnerability is also evident beyond relationships with other people. Later in the archaeological record we see direct evidence for something we might see as animal companions, in the form of animals such as dogs buried with people or as if they were people (Morey 2010) (discussed in more detail in Chapter 6). However, even around the time of early *Homo* groups, animals were more than just an objectified food source. Handaxes made from elephant bone, found from about 1.4 million years ago, for example, are less practical than their stone counterparts and suggest that elephants had some particular meaning (Barkai 2021; Zutovski and Barkai 2015). Humans might even have recognised their empathy and capacity to care for others. By the time of archaic humans, such as Neanderthals, several different types of artefacts suggest a more complex relationship with animals, including the use of raptor talons and feathers presumably as decoration (Romandini et al. 2014).

It is also particularly notable that the earliest examples of what we term 'art' show the characteristic *infant-like* proportions that prompt empathetic responses today. The Makapansgat pebble, for example, not created by humans but carried several kilometres by an australopithecine to the site of Makapansgat in South Africa, has baby-like face proportions. Similarly, the Berekhat Ram figurine from Israel, dated to 250,000–700,000bp, has infant proportions, and the first construction of a human face, the Roche-Cotard mask, made by Neanderthals and dated to 33,000bp, also has infant-like proportions. This form suggests that, whatever their appeal as 'art', a response to vulnerability was also important in the creation and use of these objects (Spikins et al. 2014). These may be evidence of the sensitivity that is critical to human attachment and learning. Attachment processes and a drive to care for objects may even be an unrecognised part of how much handled items of Upper Palaeolithic portable art may have provided comfort, much like treasured jewellery today (Bell and Spikins 2018), discussed in Chapter 5.

The effects of a drive to care for things in the world around us can be felt in far more varied spheres than we might imagine.

Implications: a long evolutionary history of human vulnerability, compassion and interdependence

There are a number of implications arising from evidence for care for illness and injury and its association with other changes taking place during human origins.

Care for adults who are vulnerable, over either the short or the long term, affects the whole structure of communities (see Figure 2.12). On a biological level, care for injury and illness changes the parameters over which selection pressures operate. Assisted childbirth, for example, increases infant survival and changes pressures on female pelvis size and shape, whilst support to allow bone breakage can reduce selective pressures on robusticity (see, for example, Stieglitz et al. 2020). On an economic and ecological level, recovery from injury allows humans to move into niches with high injury risks, such as those involving hunting dangerous animals (Spikins et al. 2019). Socially, care for vulnerable adults leads to increasing life expectancy, generating older individuals able to provide extra care for infants or support parents, and able to pass on important knowledge and skills (Spikins

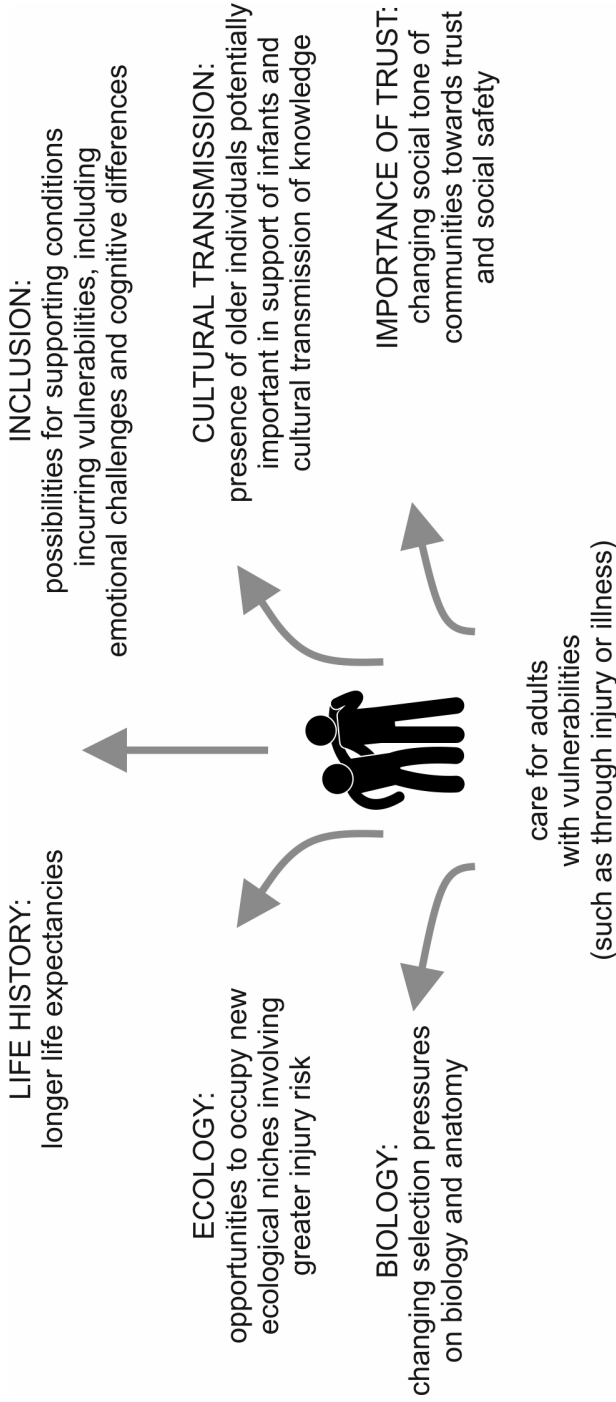


Figure 2.12: Implications of care for adults with vulnerabilities for other human traits. Penny Spikins, CC BY-NC 4.0.

et al. 2019). Older men amongst the Aché of Paraguay, for example, have a much higher rate of hunting efficiency, despite being less physically strong than their younger counterparts, as hunting requires much skill, learnt over many years or even decades (Koster et al. 2020; Walker et al. 2002). Being able to support occasional vulnerabilities also opens up possibilities of supporting individuals with conditions incurring occasional dependencies on others, including emotional challenges or cognitive differences (discussed in Chapter 3). Care also makes trust important to facilitate give and take, and opens up the possibility of developing communities with a sense of social safety (also discussed in Chapter 3).

Care for vulnerable adults also changes how we view our evolutionary past and suggests that we need to reappraise our narrative of human independence to one of interdependence, vulnerability and response. A fundamental interdependence, of which care for others' health and a reliance on others for our own is only part, seems to have been part of our evolutionary history from as far back as 2 million years ago. Much as we might like to portray an image of ourselves as physically invulnerable and independent, the average human from at least 2 million years ago onwards is likely to have suffered a range of illnesses and injuries, many of which required help from others. Almost all skeletal remains demonstrate a range of such pathologies (Trinkaus 2018b). Moreover, shared resilience comes with compromises in terms of individual emotional vulnerability – susceptibility to others' distress and a desire to help, and a certain other-focused emotional sensitivity.

We can see these interdependencies and vulnerabilities today. A fundamental dependence on others for survival is evident in modern hunting and gathering societies. For these societies, survival itself depends on willing care from others at times of need. Amongst the Aché of Paraguay, adult males are typically provisioned or cared for by others for 21% of potential hunting days when unable to hunt due to injury or illness (Gurven et al. 2000; Hill and Hurtado 2009), for example, and similar rates have been recorded amongst the Efe of the Ituri forest (Bailey 1991). Seventy-five per cent of adults amongst the Tsimane were unable to get out of bed at least once in a three-month period, for example due to being incapacitated by illness or injury (Hill and Hurtado 2009), and this period of illness lasted



more than three days in over 90% of cases (Gurven et al. 2012). It is also common to experience longer periods of incapacitation and care. Eighty-five per cent of men in the Arroya Bandera Aché had been ill or injured for at least a month over a seven-year period and would not have survived without care from others (Hill and Hurtado 2009). Willing care, regardless of the probability of survival, makes a significant difference to recovery. Healthcare provisioning significantly reduced juvenile mortality amongst the Shiwiar forager-horticulturalists, with half of the adults being incapacitated and unable to find food for themselves for at least a month (Sugiyama 2001; Sugiyama 2004).

Sharing health by caring and provisioning the ill and injured is only one aspect of a life fundamentally based on sharing in these societies. Sharing of food resources has a function for survival, minimising any individual's risk of starving themselves or being unable to provide for infants, and enhances survival of the whole group in similar ways (Ringen, Duda, and Jaeggi 2019). Most hunter-gatherers hunt collaboratively, and share the proceeds with other members of the group that they live with, and not just their kin, according to their needs. This means that, though some individuals tend to benefit more than others, overall everyone benefits from being buffered from days when they fail to bring home enough food for themselves or their family (Chapais 2013). The vulnerable consistently receive more food than the most able (Wood and Marlowe 2013). Meat, in particular, is shared both within families and between them, according to needs rather than previous contributions or status and despite how hungry the giver may be (Dyble et al. 2016; Wood and Marlowe 2013). Sharing food, however, is also about promoting harmony in social relationships (Lavi and Friesem 2019) and demonstrating self-control on others' behalves (Green and Spikins 2020).

A reliance on other people may not be as obvious in modern industrialised societies as it is in modern foragers but it is no less significant. We are all physically vulnerable at different stages of our lives, from infancy, pregnancy and childbirth, illness or injury and old age. More than this, we are also emotionally vulnerable (discussed in Part 2), and susceptible to loneliness, anxiety or the effects of unfairness or exclusion. The origin of these vulnerabilities lies in those societies that first depended on each other to survive. The more mutual survival depends on motivations to respond

to others' vulnerabilities and others' response to our own needs, the greater human sensitivities to others' welfare must become.

It might seem surprising that changes in emotional motivations seem to predate changes in complex cognition, particularly as we like to believe that our human intelligence sets us apart from other animals. As we have seen, it was after 2 million years ago that humans developed new and highly effective types of collaboration, effectively working 'like a single predatory organism' in their new hunting niche (Whiten and Erdal 2012). It is easy to assume, working from our own ideological norms, that this collaboration was built primarily on strategic goals, better communication or abilities to plan. However, in reality, moving into a new ecological niche was much more about sharing, mutual vulnerability and a human response to vulnerability.

That there is clearly no simple progression of more recognisably human-like forms might also be surprising. Yet the anatomical record demonstrates alternative pathways, from those of the paranthropines to that of *Homo naledi*, and we cannot help but wonder what other branches of 'human' remain to be discovered or, indeed, perhaps might never be found.

Further, whilst it seems reasonable to conclude that a sensitivity to others and emotional motivations to help are perhaps the most significant development in our evolutionary past, does it follow, however, that this capacity elevates humans above other animals? Given that a widespread willingness to respond to vulnerable infants in the group, to share risks and food, and to care for the ill and injured is shared, at least with African wild dogs if not other social animals besides, this seems difficult to argue. Perhaps those traits such as complex language or cultural learning that mark us out as different are *less critical* to our origins than those that might be distinctive for an ape, but link us to other species rather than dividing us from them. Perhaps, as Anderson notes, "we" (or at least those of "us" of a Western cultural tradition) urgently need to overcome the still lingering idea that being human means rising above our worldly, and indeed our animal existence' (Anderson 2019: 66).

There are, of course, many questions remaining. It is difficult to determine how dependent the earliest societies were on care for vulnerable adults for their survival, for example. Certainly, such care may have been part of their



abilities to confront predators and hunt dangerous animals whilst living with the consequences in terms of injury risks. Care for vulnerable adults almost certainly played a role at some point in our evolutionary past in allowing longer lifespans and the involvement of grandparents in infant care, as well as in the cultural transmission of knowledge, but whether this happened early in our evolutionary origins or rather later remains to be explored. We may imagine that care extended across a range of vulnerabilities, including not only physical vulnerabilities but also emotional or mental health issues. However, the latter typically leave no surviving trace in skeletal remains, making this difficult to determine. It also seems likely that care played a social role as well as a practical one, not only forging strong bonds but also promoting a sense of safety and trust that is essential to a human willingness to act in others' interests. This is, equally, a harder area to assess from the material record (discussed in Chapter 3). Care for adults made vulnerable through illness or injury is also likely to be intimately related to care of vulnerable young or vulnerable elderly, though how these types of care are related to each other remains to be understood. In modern hunting-gathering societies, bone fractures increase substantially with age. More elderly members of groups are less physically able to take on some foraging tasks, for example, but nonetheless bring important knowledge and skills in less physically demanding areas such as in tool making (Stieglitz et al. 2020). It is not only care for adults with temporary vulnerabilities but motivations to care for anyone who is vulnerable that will have transformed societies in important and, as yet, not fully understood ways.

Moreover, there is much to reflect on. We cannot help but wonder whether a new narrative of human 'success', as based not on individual performance or intellect but on emotional connection, human vulnerability and response, might cast some of our modern assumptions about human 'value' in terms of competition or intellectual merit in a new light.

Conclusions

That care for adults who were vulnerable through injury or illness was a significant feature of our evolutionary origins is rarely, if ever, mentioned in accounts of our human origins. Our own discomfort with vulnerability may partly explain this apparent paradox. In many modern industrialised cultures, a focus on being independent and competitive can make any

dependence on others feel deeply uncomfortable. However, extensive evidence for care for illness and injury, of which Shanidar 1 is only one example, suggests that our early ancestors were people who cared deeply for each other, and were prepared to go to great lengths on each other's behalf. These were populations for whom vulnerabilities and sharing responses from others were common.

As we have seen in Chapter 1, there are adaptive explanations for increasing significance of emotional dispositions towards helping others and responding to vulnerability. As well as being fundamental to being human, the archaeological record for an increasing prevalence and intensity of care suggests that changes in emotional dispositions were far more key to social transformation than has been assumed. An apparently simple response, to care for others in need or distress, becomes in humans an integral part of how societies work, the so-called 'glue' that holds us together. Rather than our intellectual capacity for language or technological skills making us human, our emotional connections to others and tendencies to respond to their vulnerabilities may have been more important.

Extended tendencies to focus on others, and be emotionally motivated to act on their behalf, did not come without costs. Collaboration based on emotional motivations comes at an individual cost of sensitivity to others' distress. Furthermore, in an evolutionary context, the more interdependent social communities became, and the greater investments made to helping others, the more important it will have been to know who one could trust – whose motivations were genuine, and whose were not. Here began our worries and anxieties about what others think about us, and who we can trust (explored in Chapter 3).

Key points

- After 2 million years ago, we see evidence for care for vulnerable adult humans who suffer illness or injury. This seems to be part of a critical process of transformation in emotional motivations within early members of the genus *Homo* and which includes motivations to help others in other realms such as hunting, food sharing and infant care.



- This significant transformation towards greater interdependence and emotional motivations to respond to vulnerability may represent a shift in response to ecological opportunities or changes, and shares similarities with the emotional responses to other group members seen in animals such as social carnivores.
- More extended periods of care, and more complex cognitive planning and knowledge involved in long-term care, appear later in human evolution, particularly in archaic humans. If any differences are apparent between care in archaic and modern humans, they are subtle and probably related to cultural context rather than emotional responses.
- Care for vulnerable adults has potentially significant implications for biology, subsistence practices, social relationships, cultures and the emotional connections within communities. The importance of such care also suggests a reappraisal of our assumptions about key driving factors in our evolutionary past.

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