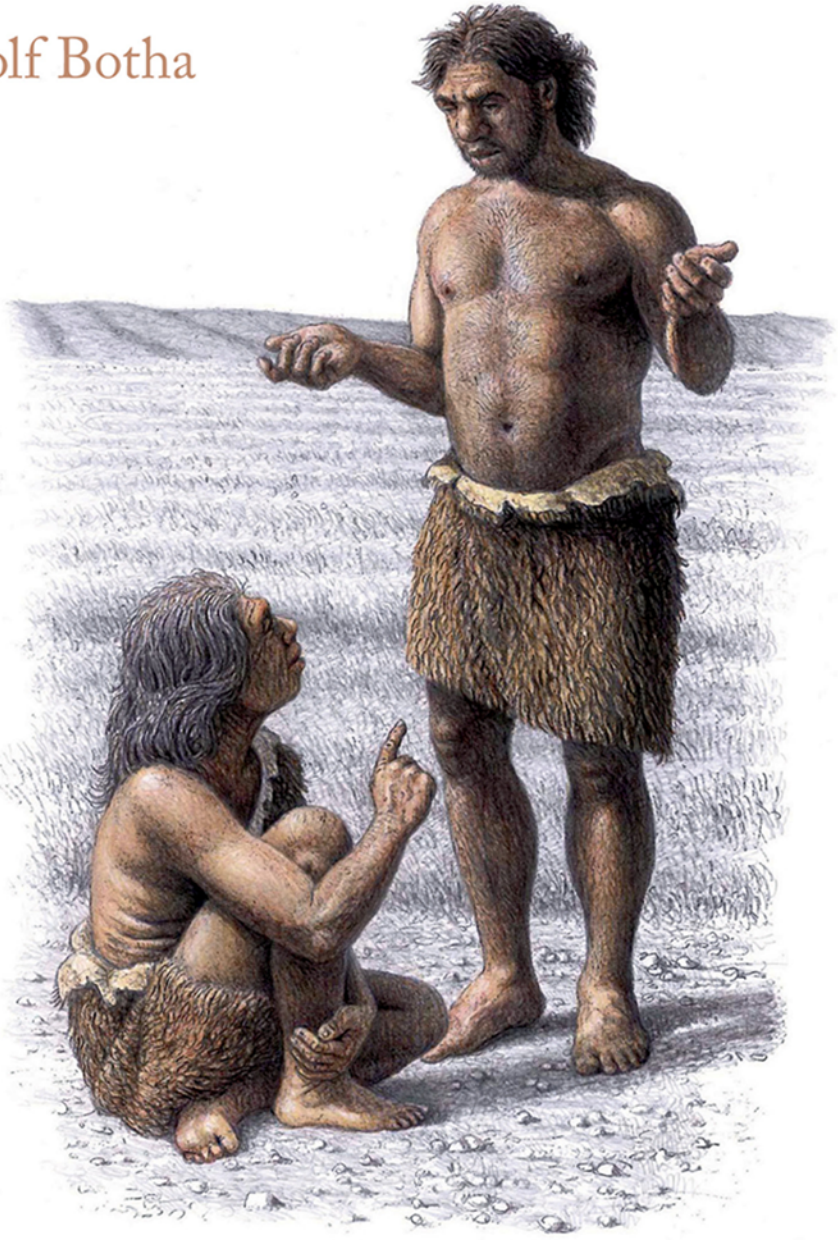
Neanderthal Language

Demystifying the Linguistic Powers of our Extinct Cousins

Rudolf Botha



Neanderthal Language

Did Neanderthals have language and, if so, what was it like? Scientists agree overall that the behaviour and cognition of Neanderthals resemble that of early modern humans in important ways. However, the existence and nature of Neanderthal language remains a controversial topic. The first in-depth treatment of this intriguing subject, this book comes to the surprising conclusion that collective hunting is a better window on Neanderthal language than other behaviours. It argues that Neanderthal hunters employed linguistic signs akin to those of modern language, but lacked complex grammar. Rudolf Botha unpacks and appraises important inferences drawn by researchers working in relevant branches of archaeology and other prehistorical fields, and uses a large range of multidisciplinary literature to bolster his arguments. An important contribution to this lively field, this book will become a landmark book for students and scholars alike, in essence, illuminating Neanderthals' linguistic powers.

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The Museum of Neanderthal Man: Image 6.1, A reconstruction of the skeleton of The Old Man in The Museum of Neanderthal Man at La Chapelle-aux Saints, France.

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João Zilhão: Image 3.2, The perforated marine shells from level II of Cueva de los Aviones; Image 4.1, The hashtag engraving from Gorham's Cave, Gibraltar; Image 4.2, A red hand stencil from El Castillo Cave Frieze G; Image 4.3, A red scalariform (ladder-shaped) sign, panel 78 in hall XI of La Pasiega gallery C.

Part I

Preliminaries

1 Pursuing an Intriguing but Murky Matter

1.1 Questions and Concerns

'Did Neanderthals have language?' and 'If they did, what was it like?' These questions have intrigued people from the earliest discoveries of fossil remains of Neanderthals in the nineteenth century right up to the present. To many, laypersons and scholars alike, the fascination of these questions has lain not only in what credible answers may reveal about our extinct cousins but also in what they may teach us about ourselves; amongst other things, about whether we are unique in being the only species endowed with language. This makes it understandable why these two questions about Neanderthal language have been pursued over nearly a century-and-a-half by scholars in a range of fields, including anthropology, archaeology, biology, linguistics and palaeontology.

This book is about the pursuit of these two questions about Neanderthal language. Its discussion of this pursuit is guided by the following main concerns:

Main Concerns

(a) What has the pursuit of the two questions about Neanderthal language yielded in the way of credible answers?
(b) What is it that makes an answer to a question about Neanderthal language more credible or less credible?
(c) What are the obstacles that have impeded this pursuit?
(d) What is needed to overcome these obstacles?

Framed in terms of crude conceptions of 'language', the very earliest answers to the question of whether Neanderthals had language were less than kind to them. That is, not distinguishing between language and speech, these answers expressed claims such as the following:

Some Early Claims about Neanderthal Language

(a) Neanderthals were incapable of 'articulate speech'.
(b) Neanderthals lacked intelligence and speech.
(c) Neanderthals were 'non-speaking individuals'.

The French archaeologist Gabriel de Mortillet (1821–98) is considered the first scholar to have clearly expressed a negative view of Neanderthals' linguistic ability in his book *Le préhistorique antiquité de l'homme* (1883). More specifically, he claimed that the Neanderthal whose lower jawbone was excavated in 1866 at La Naulette in Belgium had been 'incapable of articulate speech'. De Mortillet inferred this from his observation that the Naulette jawbone lacks the two small pairs of bumps, so-called genial or mental tubercles, needed for articulate speech. The muscle that connects the tongue to the skull is inserted into these tubercles. De Mortillet reasoned as follows:

> Speech, or articulate language, is produced by movements of the tongue in certain ways. These movements are effected mainly by the action of the muscle inserted in the genial tubercle. The existence of this tubercle is therefore essential to the possession of language. Animals which have not the power of speech do not possess the genial tubercle. If, then, this tubercle is lacking in the Naulette jawbone, it is because the man of Neanderthal, the 'Chellcan [sic] man,' was incapable of articulate speech.[1]

The view that Neanderthals lacked 'linguistic ability' was shared by other early scholars, including the French palaeontologist Marcellin Boule (1861–1942). He claimed that a male Neanderthal – called 'The Old Man' – whose bones were discovered in 1908 in a cave near the village of La Chapelle-aux-Saints in central France was a dull-witted, brutish, inarticulate individual. Boule inferred this from his reconstruction in 1911 of the skeleton of this Neanderthal. In terms of this reconstruction, The Old Man had a low-vaulted cranium and a large brow ridge reminiscent of that of large apes such as gorillas (See Image 1.1).[2] The view that Neanderthals lacked language/speech forms a cornerstone of the early position that Neanderthals were 'knuckle-dragging brutes', 'brutish cave-dwellers', 'primitive ape-men' who differed in fundamental ways from modern humans.

In a positive interpretation of recent research, Neanderthals differed much less in important ways – including the use of a form of language – from modern humans than believed earlier. Thus, in a readable overview of a considerable body of such work, Papagianni and Morse (2015) write that:

> In recent years new research has pulled the Neanderthals much closer to us. Not only did they have brains as large as ours (though their skulls had a different, flatter shape), they also buried their dead, cared for the disabled, hunted animals in their prime, *used a form of spoken language* [emphasis added – R.B.] and even lived in some of the same places as the modern humans who were, broadly speaking, their contemporaries. They could not have survived, even in warmer times, had they not mastered fire and worn clothes. Though they relied heavily on meat, they consumed seeds and plants, including herbs, and could fish and harvest sea food. These are all behaviours that at some point were thought to be exclusive to ourselves. (Papagianni and Morse 2015: 13)[3]

Image 1.1 A cast of the skull of The Old Man of La Chapelle-aux-Saints as reconstructed by Bone Clones, Inc.

This positive interpretation of what recent research reveals about some similarities between Neanderthals and modern humans, however, is controversial. Thus, present-day scientists give conflicting answers to the question of whether Neanderthals had language and/or speech. The same goes for modern views about what Neanderthal language, if it existed, might have been like. Consider in this regard the recent claims about Neanderthal language in (a) and the counter-claims in (b), the latter having been made to controvert the former or to express disbelief about them.

Some Recent Claims about Neanderthal Language

(a) Claim by Krause et al. (2007: 1911): Human language ability was present not only in modern humans but also in late Neanderthals.
(b) Counter-claim by Benítez-Burraco et al. (2008: 225): Krause et al.'s analysis does not confirm either the antiquity of the faculty of human language or the linguistic capabilities of Neanderthals.

(a) Claim by Frayer et al. (2010: 113): Neanderthals (and very likely their European ancestors) had linguistic capacities similar to living humans.
(b) Counter-claim by Benítez-Burraco and Longa (2012: 189): Frayer et al.'s conclusion, according to which Neanderthals had complex language, is far from obvious.

(a) Claim by Dediu and Levinson (2013: 1): Neanderthals shared with us something like modern speech and language.
(b) Counter-claim by Berwick et al. (2013: 2): Dediu and Levinson's extraordinary claims are not supported by the evidence they present.

(a) Claim by Lieberman (2015: 2): Neanderthals must have possessed speech and language, though their vocal tracts precluded their mastering any human dialect.
(b) Counter-claims by Bolhuis et al. (2015: 2): (i) Lieberman's speculation that Neanderthals had 'simple syntax' is not supported by any evidence from non-human primates. (ii) Palaeoanthropological evidence suggests that the faculty of language, including human syntax, emerged some 70,000–100,000 years ago.

Made by various kinds of linguists, biologists, geneticists and prehistorians, the claims and counter-claims about Neanderthal language presented here represent the proverbial tip of the iceberg. They constitute but a small sample of the conflicting claims about Neanderthal language to be found in a large, multidisciplinary body of literature. Particularly prominent among the disciplines involved are those concerned with unravelling our prehistory. Thus, archaeologists and palaeoanthropologists disagree strongly about the linguistic abilities and language of Neanderthals. Some attribute to them modern language or a communication system equivalent or similar to it (e.g., d'Errico and Vanhaeren 2009: 38; Frayer at al. 2010: 113; Papagianni and Morse 2015: 178). Others contend that Neanderthals had a restricted, non-modern form of language (e.g., Conard 2015: 13; Finlayson 2004: 129; Gamble et al. 2014: 142; Stringer 2011: 157–159; Wynn and Coolidge 2014: 128, 176). According to a third group, Neanderthals had only a non-symbolic form of communication that is qualitatively distinct from modern language (e.g., Mithen 2014: 12; Tattersall 2017: 65).

The debates about conflicting claims such as these have been complex and inconclusive. There simply are no answers to the questions 'Did Neanderthals have language?' and 'If they did, what was it like?' that seem to be immune to challenge. An answer that one scholar would consider highly credible would elicit disbelief from the next. This makes the matter of the existence and properties of Neanderthal language a murky one. By addressing the four main concerns stated at the beginning of this chapter, this book attempts to disperse the murk.

1.2 The Approach

The important issue here, clearly, is: 'What is it that makes an answer to a question about Neanderthal language more credible or less credible?' In the absence of a well-founded conception of 'credibility', it is impossible to engage with the other three main concerns. So, what does 'credible' mean here? In essence, the credibility of answers to the questions as to whether Neanderthals had language and, if they did, what it involved depends on the soundness of the inferences drawn about Neanderthal language. How is that? It is an uncontested fact that there is no direct evidence about whether

Neanderthals had language and, if they did, what it involved.[4] As a consequence, the claims that have been made about Neanderthal language represent conclusions inferred from indirect evidence – that is, from evidence about phenomena other than Neanderthal language. Departing from such indirect evidence, and often comprising multiple steps, such inferences are not obviously sound. But unless they are sound, their conclusions will be false, which causes what they claim about Neanderthal language to lack credibility.

This line of thinking about the credibility of claims about Neanderthal language is derived from the approach to the study of language evolution known as the 'Windows Approach'.[5] This approach provides the conceptual means to overcome the obstacle posed by the lack of direct evidence to the empirical investigation of language evolution. At its core lies the assumption that the evolution of language can be studied by examining other phenomena about which there is direct evidence. These 'other' phenomena are said to offer windows on the evolution of language. Metaphorically, a window on language evolution is a phenomenon (at least some of) whose properties are believed to offer a 'view on' properties of some facet of language evolution. Modern work on language evolution uses a varied range of such window phenomena: (fragments of) fossil skulls; ancient artefacts such as stone tools; Middle Stone Age shell beads; the communicative, pedagogic and ritual behaviour of modern hunter-gatherers; restricted linguistic systems such as pidgins (i.e., languages highly restricted in both vocabulary and structure, limited in their functions and typically used in contact situations only); genes believed to be involved not only in human language and speech but also in birdsong; and the communicative behaviour and cognition of non-human primates and other animals, to mention only some. On a non-metaphorical construal, a window on language evolution is a conceptual construct used for making inferences about this phenomenon. To – metaphorically – 'see' a property of some facet of language evolution by – metaphorically – 'looking at' a property of some other phenomenon is – non-metaphorically – to infer the first property, or something about it, from data about the second property. Such inferences are called 'window inferences'. De Mortillet's inference from data about the Naulette jawbone – the 'other' or window phenomenon – that the Neanderthal concerned was incapable of articulate language/speech represents a typical instance of a window inference.[6]

The idea of a window inference can be made more concrete with the aid of some that have been drawn about the evolution of modern human language. So, consider the following three (Botha 2016: 4–5):

Three Instances of Window Inferences

(a) *The pidgin inference:* From data indicating that the words making up sentences in early-stage pidgin languages are strung together like beads

on a string, it is inferred that the word-like elements uttered in protolanguage (which is believed to be a rudimentary form of language used by early hominins) were strung together like beads on a string too (Bickerton 2009 187–88, 202–04).

(b) *The motherese inference:* From data about the properties of modern motherese (i.e., the sing-song register that is used by caregivers when addressing babies), it is inferred that the infant-directed vocalisations of ancestral motherese used by early hominins formed the prelinguistic foundations of protolanguage (Falk 2004: 491, 2009: 58–60, 69, 99).

(c) *The music inference:* From data about the similarities between modern language and music, it is inferred that these two phenomena evolved from a common precursor, called 'musilanguage' (Brown 2001: 272), 'Hmmmmm' (Mithen 2005: 26) or 'musical protolanguage' (Fitch 2010:474–75).

Window inferences are by their very nature not evidently sound. The Windows Approach, accordingly, provides for various soundness conditions that need to be met, as well as the conceptual means of meeting them. These conditions and means will be set out in a concrete way in Chapter 3.

1.3 Focus and Organisation

A wide range of putative windows have been used in work that draws inferences about Neanderthal language and/or speech.[7] This book does not offer a survey of the full gamut of these windows. In attempting to address the four main concerns stated in Section 1.1, I instead critically examine a range of window inferences about Neanderthal language that are considered in the literature to be especially important. I, moreover, restrict this examination in two general ways. First: proceeding from the fundamental distinction between language as something cognitive and speech as something behavioural, I confine my analysis to window inferences drawn about Neanderthal language as opposed to speech. For, within a principled linguistic ontology, speech presupposes language, being the use of language in the vocal-auditory modality. That is, if Neanderthals lacked language, they could not have spoken – not even if they had the physical attributes needed for speaking. Second: I focus on window inferences drawn from selected forms of behaviour attributed to some Neanderthals. The selected behaviours are those viewed in a massive literature as currently providing the best windows on what Neanderthals might have had in the way of language. The focus on behaviours is in line with an approach to the study of the evolution of cognition characterised by Iain Davidson as follows:

the primary evidence [for the evolution of cognition – R.B.] should come from archaeological evidence for behavior rather than from skeletal remains, genetic arguments, or any other form of inference that does not rely on evidence of behaviour. (Davidson 2010a: S179)

Appraising the inferences concerned is not only instructive in itself; it will be seen also to give a non-arbitrary indication of the heuristic power of the windows that have been used to draw these inferences.

The account provided in this book is organised in terms of four parts:

PART I contains, in addition to this introductory chapter, a second chapter in which I present the conceptual tools that are used in the analyses of subsequent chapters. It illustrates these concepts, distinctions, principles and conditions with the aid of a sample analysis of window inferences that have been drawn from the scratched teeth of some Neanderthals about their so-called linguistic capacities.

PART II critically analyses inferences drawn about Neanderthal language from four forms of symbolic behaviour in which they are claimed to have engaged: manufacturing and wearing personal ornaments (Chapter 3), producing cave art (Chapter 4), decorating their bodies (Chapter 5) and burying the dead (Chapter 6). Part II, moreover, includes an appraisal of the soundness of the inferential step from Neanderthals' alleged symbolic behaviours to the language attributed to them (Chapter 7). Since the alleged symbolic behaviours of Neanderthals have been widely taken to provide the best evidence for attributing language to these ancient humans, the findings made in PART II are particularly pertinent.

PART III assesses inferences drawn about Neanderthal language from a number of complex *non*-symbolic behaviours attributed to Neanderthals: making stone tools (Chapter 8), teaching/learning how to make such tools (Chapter 9) and cooperatively hunting big game (Chapter 10). The discussion of these inferences may also serve to counterbalance views that overestimate the heuristic power of symbolic behaviours as windows on Neanderthal language.

Part IV contains the final chapter (Chapter 11), in which I unpack some of the more important implications of the findings of preceding chapters. In doing this, I return to the view that inferences about Neanderthal language should be primarily drawn from behaviours of Neanderthals. After all, such inferences have frequently been drawn from non-behavioural attributes of Neanderthals. To get a measure of the soundness of such inferences, I analyse instances that have been drawn from genetic and neuroanatomical attributes of Neanderthals.

1.4 Preview

Which brings us to what this book offers in the way of main findings about the soundness of important inferences that have been drawn about Neanderthal language. The following four can serve as a foretaste:

Four Main Findings

(a) There are strong doubts about the soundness of all the analysed inferences drawn about Neanderthal language from the allegedly symbolic behaviours, non-symbolic behaviours and non-behavioural attributes explored in this book.
(b) From an inferential perspective, Neanderthals' cooperative ambush hunting is potentially a better window on Neanderthal language than their allegedly symbolic behaviours.
(c) In terms of conservative inferences drawn from the behaviour of Neanderthal hunters, their communication system employed referential elements resembling Saussurean linguistic signs, but lacked grammatical complexity.
(d) The main obstacle to overcome in work on Neanderthal language is not a paucity of evidence; it is rather a lack of warrants needed for licencing inferences drawn about Neanderthal language from data about phenomena distinct from Neanderthal language. See Chapter 2 for a discussion of warrants in some detail.[8]

It may not be superfluous to stress here what the book does not offer. Focusing on inferences about Neanderthal language, it does not offer an appraisal of inferences drawn from Neanderthals' biological attributes about their alleged speech capabilities. We can now turn to the conceptual tools used for the analyses carried out in PARTS II, III and IV of this book.

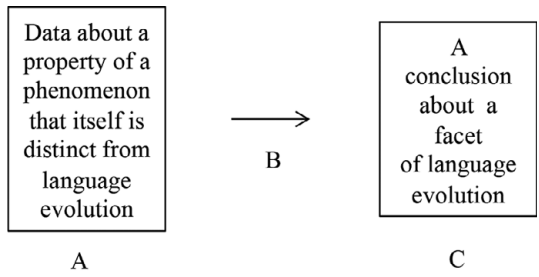
2 Telltale Neanderthal Teeth

2.1 The Scratched-Teeth Inference

Consider again Frayer et al.'s (2010: 113) claim that 'Neandertals... had linguistic capacities similar to living humans'.[1] This claim represents a conclusion inferred stepwise from data about scratches in a number of anterior teeth of three groups of European Neanderthals. In the present chapter I analyse this inference for the purpose of setting out and illustrating the conceptual tools – derived from the Windows Approach to language evolution – to be used in the analyses made in subsequent chapters of this book. I do this by addressing the following questions about this inference, to which I will refer as 'the scratched-teeth inference': 'How is this inference structured?', 'What are the conditions that this inference should meet to be sound?', 'To what extent does it meet these conditions?', 'If it fails to meet some or all of these conditions, why is that so?' and 'In what ways could its deficiencies be remedied?'

To be able to unpack the scratched-teeth inference, it is necessary to draw a distinction between structurally simple and structurally composite window inferences (Botha 2016: 5–7). A simple window inference has a surface layer made up of three basic components: data about a phenomenon other than language evolution, a conclusion about some facet of language evolution and an inferential step by which this conclusion is drawn from these data. The pidgin inference, motherese inference and the music inference presented in Section 1.2 are simple window inferences. The structure of a simple window inference may be schematically represented by Figure 2.1.

Many window inferences about language evolution are structurally composite in that they use a chain of two or more inferential steps for deriving a conclusion about language evolution from data about a phenomenon other than language evolution. In a composite inference, the first inferential step starts from data about a window phenomenon. Inferential steps further along the chain, by contrast, starts on the whole from conclusions – complemented occasionally by additional data or assumptions – arrived at in prior steps. The scratched-teeth inference is such a composite inference. On a careful analysis, it is made up of four simple inferential steps:



[where arrow B represents the inferential step]

Figure 2.1 Basic structure of a simple window inference about language evolution

Four Steps in the Scratched-Teeth Inference

First step: From data about oblique scratches in a number of anterior teeth of three groups of European Neanderthals, it is inferred that the scratches were made by these Neanderthals using their right hand in eating.

Second step: From the conclusion that these scratches were made by these Neanderthals using their right hand, it is inferred that they were right-handed like living humans.

Third step: From the conclusion that these Neanderthals were right-handed, it is inferred that their brains were left-lateralised similarly to those of living humans.

Fourth step: From the conclusion that the brains of these Neanderthals were left-lateralised like those of modern humans, it is inferred that European Neanderthals had linguistic capacities similar to living humans.[2]

To facilitate the discussion below, I schematically represent these four inferential steps in Figure 2.2.

Turning to the question of the conditions on the soundness of window inferences, it has to be considered against the background of the distinction between simple and composite window inferences. For a simple inference to be sound, each of its basic components – the data, the conclusion and the inferential step – needs to meet a particular soundness condition (Botha 2016: 17–24). The soundness of composite inference, in turn, depends on the soundness of the simple inferences of which it is composed. That is, each of these simple inferences needs to be sound, meeting the soundness conditions applying to its components. So, let me turn to the applicable soundness

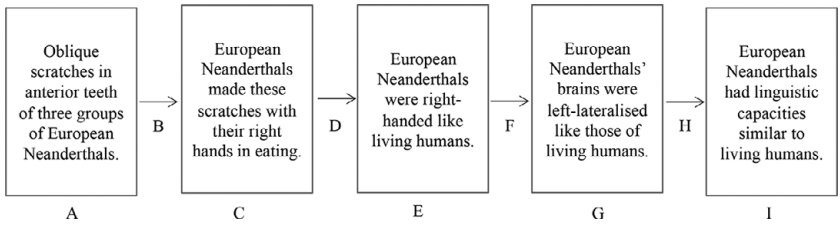


Figure 2.2 The scratched-teeth inference

conditions, illustrating them with reference to the scratched-teeth inference. This illustration, be it noted, is not intended to give a full appraisal of the soundness of the scratched-teeth inference.

2.2 A Cloudy Conclusion about 'Linguistic Capacities'

To begin with, we consider the soundness of the fourth of the simple inferences – represented by GHI in Figure 2.2 – by focusing on its conclusion that 'European Neanderthals had linguistic capacities similar to living humans'. This conclusion needs to meet the soundness condition known as the 'Pertinence Condition', which reads as follows:

The Pertinence Condition
The conclusion of a (simple) window inference needs to be properly pertinent. (Botha 2016: 20)

But what does it mean for a conclusion arrived at by way of a window inference to be 'properly pertinent'? In a nutshell, it means that the linguistic entity referred to in the conclusion needs to be accurately identified and correctly characterised. Unless this is the case, it is not clear what the conclusion in question is about, or whether there is something in the real world that corresponds to the entity central to the conclusion.

So, does the conclusion that European Neanderthals had linguistic capacities similar to living humans satisfy the Pertinence Condition? Notice in this regard that in stating this conclusion, Frayer et al. (2010) alternatively refer to the linguistic entity attributed by them to European Neanderthals as 'linguistic capacities similar to living humans' (p. 113), 'language capacity' (p. 122), 'complex language skills' (p.122) and 'linguistic competence' (p. 122). But they neglect to characterise this entity in terms of its distinctive properties. This is unfortunate since, in the linguistic domain, capacities and skills are, on a standard view, entities that differ in kind. The same applies to competence and skills. Whereas linguistic capacities or linguistic competence are found in the domain of cognition, language skills occur in the domain of behaviour.

When criticised by Benítez-Burraco and Longa (2012) for this obscurity, Frayer et al. respond in a later article as follows:

> we retract the one time we used 'complex linguistic skills,' – this slipped by our editing. In fact, we do not know what 'complex language' or 'complex linguistic skills' mean since any language is complex. We only argue that Neandertals and their European forebears had linguistic competence similar to ours. (Frayer et al. 2012: 193)

How adequate, then, is this response? Not particularly: it fails to clear up the obscurity in question, as is clear from the following statement with which Frayer et al. conclude their response:

> We submit that the preponderance of evidence (not simply handedness, hemispheric lateralization or FOXP2), leads to the conclusion that **Neanderthals spoke** [emphasis added – R.B.]. (Frayer et al. 2012: 195)

The statement that 'European Neanderthals had linguistic capacities or competence' and the statement that 'Neanderthals spoke' express two distinct claims. The former claim is about a cognitive structure that Neanderthals might have had, the latter about a form of behaviour in which they might have engaged. From the relevant literature, it is clear that having language, linguistic capacity or competence does not entail that it is also used for speaking. Speaking, that is, represents but one of the potential uses of language, thinking being another important one. Conversely, having the anatomical infrastructure required for speaking and hearing does not entail having language, linguistic capacity or competence. Components of this infrastructure were used for non-linguistic purposes before they were exapted for speaking and hearing.[3] In essence, Frayer et al. fail to draw the fundamental distinction between language as a component of cognition and speaking/speech as a form of behaviour. As a consequence, their conclusion 'European Neanderthals had linguistic capacities or competence similar to living humans' fails to identify unambiguously the linguistic entity they attribute to these Neanderthals. This conclusion, accordingly, is not properly pertinent and the simple inference of which it is a component is not sound. Its unsoundness carries over to the scratched-teeth inference as a composite inference.

The lack of pertinence of Frayer et al.'s conclusions that 'European Neanderthals had linguistic capacities similar to living humans' and that 'Neanderthals spoke' is symptomatic of a deeper-lying lacuna in their reasoning: these conclusions are not underpinned by an adequate linguistic ontology. What does this mean? As components of window inferences, conclusions about the evolution of language need to be underpinned by various theories which accurately identify and adequately characterise the entity or entities about which conclusions are drawn. Central to these underpinning theories, is a linguistic ontology (Botha 2016: 20ff.).[4] This is a theory of the large-scale

entities that are believed to populate the linguistic domain. These entities include language, (individual) languages, the human language capacity or faculty of language, tacit knowledge of language or linguistic competence, language behaviour, speech and other forms of language use or externalising language, linguistic skill and so on. And with respect to language, various forms of language – including full language, restricted forms of language or restricted linguistic systems, modern language, and forms of ancestral language such as protolanguage – are among the entities that may be found in the linguistic domain. The distinction between the language faculty in a broad sense (FLB) and the language faculty in a narrow sense (FLN) is an example of a finer distinction that has been made between entities claimed to occur in the linguistic domain.[5] This is also the case with the distinction between I(nternalised)-language and E(xternalised)-language.[6] A further ontological distinction drawn by some is that between having language as such or a capacity for or faculty of language, on the one hand, and having a particular individual language as an instantiation of this faculty or capacity. This distinction is invoked, for instance, by scholars who contend that *Homo sapiens* had the cognitive 'potential' for language some 200,000 years ago but that this potential 'lay fallow for around 100,000 years'. In terms of this contention, modern humans had for about 100,000 years the cognitive capacity for language without having had it instantiated as one or more specific languages.[7]

The function of a linguistic ontology is to draw a principled distinction among linguistic entities such as those just mentioned, characterising them in a non-ad hoc way. Thereby, such an ontology should make it impossible for two linguistic entities that have different properties – for example the entity language and the entity speech – to be treated as if they were the same thing. And conversely, where two linguistic entities have the same properties, an ontology of that sort should make it impossible for the two entities to be treated as distinct in any more-than-terminological way.[8] The Pertinence Condition applies to the three other conclusions in the scratched-teeth inferential chain as well: to the conclusion that 'European Neanderthals made these scratches with their right hands' (see C in Figure 2.2); to the conclusion that 'European Neanderthals were right-handed like modern humans' (see E in Figure 2.2); and to the conclusion that 'European Neanderthals' brains were left-lateralised like those of modern humans' (see G in Figure 2.2). So, how do these conclusions rate in regard to pertinence? In the literature at least they have not (yet) been criticised as lacking pertinence. That is, the concepts of '(right-) handedness' and '(left-) lateralisation' that are central to these conclusions have not been criticised for referring to obscure entities. In Section 2.4, though, it will be shown that, unless a sufficiently clear distinction is drawn between the different *kinds* of phenomena referred to by these concepts, the soundness of inferences such as that of the scratched-teeth is jeopardised.

2.3 Some Decent Data about Scratched Teeth

Which brings us to the second fundamental condition on the soundness of window inferences, The Groundedness Condition. For the purpose of illustrating this condition, I use the first component of the scratched teeth inference: the simple inference represented by ABC in Figure 2.2. As suggested by its name, The Groundness Condition applies to the empirical grounding of the first inferential step of such inferences and, accordingly, to the grounding of the inferential step represented by arrow B in Figure 2.2. This condition reads as follows:

The Groundedness Condition
The inferential step leading to some conclusion about language evolution needs to be properly grounded in data about a window phenomenon. (Botha 2016: 19)

The Groundedness Condition says two important things about what the proper grounding of an inferential step leading to a conclusion about language evolution should involve. First, the data that provide the grounding should be factual, i.e., accurate. Second, the data should be informative of a window phenomenon that is well understood. Clearly, one cannot learn anything about the evolution of language from a window phenomenon about which little is known reliably or which itself is poorly understood. This entails amongst other things that the grounding data should be adequately analysed; it is not possible to infer anything of significance from raw data about some putative window phenomenon. Most of the phenomena from which inferences have been drawn about language evolution are such that we cannot understand them by direct observation or by simple forms of inspection. The only way to come to understand such window phenomena is to form theories about them, which represents the standard approach in empirical science. This means that, on the whole, the data from which an inferential step starts, need to be underpinned by an insightful theory of the window phenomenon concerned. Such theories have been dubbed 'grounding theories' (Botha 2016: 25).

How good, then, is the grounding provided by the data about the scratches in Neanderthal teeth – represented in box A of Figure 2.2. – for the inferential step, represented there by arrow B? To be able to judge this, we first need to consider the accuracy of these data:

Data about Scratches in Neanderthal Teeth
(a) The data include two sets:
  (i) New data gleaned by Frayer et al. from scratches (or striations) in seven teeth of Neanderthals, whose fragmentary remains were excavated in the 1870s in the Vindija Cave in northwest Croatia.
  (ii) Older data derived earlier by different investigators from scratches in the teeth of fifteen Neanderthals whose remains were recovered at Sima

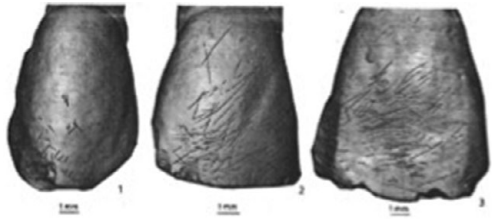


Image 2.1 Scratches on three Vindija maxillary teeth
(Frayer et al. 2010: 118)

de Los Huesos (Atapuerco, Spain) and scratches in the teeth of seven Neanderthals whose remains were recovered at Krapina in Croatia.

(b) The teeth at issue are incisors (i.e., sharp-edged teeth for cutting and gnawing) and canines (i.e., pointed teeth for biting and chewing, located next to the incisors) in both the upper and lower jaw.
(c) The scratches are in the labial surface (i.e., the surface facing the lips) of the teeth.
(d) The scratches are right oblique (i.e., slanting from the top-left to the bottom-right of the teeth), as depicted in Image 2.1.
(e) Scratches on adjacent incisors and canines exhibit the same pattern.

Frayer et al. (2010: 118, 120) provide a number of images of the Vindija teeth that show the angle of the scratches at issue. For three of these images, see Image 2.1.

But how accurate are Frayer et al.'s data? With the aid of various means – including moulds, 20x magnification and digital photography – they have carefully measured the quantity, angle and length of the scratches in each of the Vindija teeth, subjecting the raw data to statistical analyses. The accuracy of these measurements has to date not been seriously questioned in reviews such as those by Coyne (n.d.) and Lozano et al. (2017). Frayer et al.'s interpretation of the origin of the scratches has been questioned. But this is a different matter, to which I will return below. In the absence of serious challenges, Frayer et al.'s first inferential step, represented by arrow B in Figure 2.2, may accordingly be judged to satisfy the Groundedness Condition from the perspective of accuracy. A re-evaluation by Fiore et al. (2015: 19) of the scratches into the enamel of the Krapina Neanderthals' teeth confirms, according to them, '... the earlier results of a predominant right-handed pattern from the striations' obliquity on the incisors and canines'.

Which brings us to the grounding of Frayer et al.'s three further inferential steps, represented by respectively D, F and H in Figure 2.2. Unlike the first step, B, these further steps do not start directly from the scratched-teeth data.

They start from conclusions – represented in boxes C, E and G – reached by preceding steps. This does not mean, however, that steps D, F and H need not themselves be properly grounded. The extent to which they are grounded depends on the firmness of the conclusions from which they start. And the firmness of these conclusions depends on the soundness of the inferential steps by means of which they are drawn. So, what does it involve for an inferential step to be sound?

2.4 Uneven Inferential Steps to Handedness, Lateralisation and 'Linguistic Capacities'

As the third component of a simple window inference, the inferential step needs to meet the soundness condition dubbed the 'Warrantedness Condition':

The Warrantedness Condition
The inferential step leading to some conclusion about language evolution needs to be properly warranted. (Botha 2016: 17)

To see what this condition involves, it is essential to keep in mind a basic property of window inferences about language evolution. The data or assumptions from which an inferential step starts out are about one thing, namely a putative window phenomenon; the conclusion with which the step ends, however, is about another thing, namely a facet of language evolution. As a consequence, a question arises: 'What makes it proper to draw an inference about this facet of language evolution from the former data or assumptions?' This question calls for a warrant that licenses the inferential step from data or assumptions about a window phenomenon to a conclusion about language evolution. In the absence of an appropriate warrant, a window inference is unsound – as stated in the Warrantedness Condition.

To set out in concrete terms what the Warrantedness Condition involves, I return to the scratched-teeth inference, noting that each of the four inferential steps taken in it requires a warrant:

Warrants Required by Inferential Steps in Scratched-Teeth Inference

(a) **Inferential step B:** A warrant for moving inferentially from (data about) physical properties of scratches in teeth to (a conclusion about) actions performed to cut food with the right hand.
(b) **Inferential step D:** A warrant for moving inferentially from (a conclusion about) actions performed to cut food with the right hand to (a conclusion about) a preferential mode of behaviour involving the predominant use of the right hand.
(c) **Inferential step F:** A warrant for moving inferentially from (a conclusion about) a preferential mode of behaviour involving the predominant use of

the right hand to (a conclusion about) lateralisation as a feature of the left hemisphere of brains.

(d) **Inferential step H:** A warrant for moving inferentially from (a conclusion about) lateralisation of the left hemisphere of brains to (a conclusion about) the presence in that hemisphere of cognitive linguistic capacities.

Teeth scratched in a particular way, actions performed with the right hand, right-handedness, left-lateralisation and a capacity for language – clearly these represent five different kinds of phenomena. Data about one of these phenomena are by their very nature not direct evidence about any of the other four. Herein lies the rationale for reconstructing the scratched-teeth inference in terms of four inferential steps instead of just one or two or three. Claims about these five phenomena need, accordingly, to be linked by warranted inferential steps. A failure to draw clear ontological distinctions among these four phenomena is what results in those reconstructions of the scratched-teeth inference that provide for less than four inferential steps, a possibility mentioned in note 2.

To illustrate the Warrantedness Condition, I discuss inferential step B as an instance of an adequately warranted one, inferential step F as an instance of a questionable one, and inferential step H as an instance of a clearly unsound one.

2.4.1 The Sound Step from Scratched Teeth to Eating with the Right Hand

Consider first the inferential step represented by B in Figure 2.2. As noted already, this step starts from data about something physical – scratches in Neanderthal teeth – to arrive at a conclusion about certain actions – Neanderthals using their right hands in eating. Accordingly, the question is: 'Why is it warranted to draw from data about the former phenomenon a conclusion about the distinct latter one?' This question calls for a bridge theory that gives an account of how properties of scratches on certain of their teeth are interrelated with certain actions that Neanderthals performed with their right hand. Forming part of empirical work, the claims expressed by a bridge theory about the links between the scratches on anterior Neanderthal teeth and the actions performed by Neanderthals with the right hand in eating can be true or false. This implies that these bridging claims need to be (i) empirically appraisable and (ii) supported by empirical evidence or considerations of an empirical sort. This is to say, amongst other things, that these claims cannot be fanciful speculations or bald stipulations.[9] What, then, is the bridge theory adopted by Frayer et al. for warranting inferential step B? Though they do not present this theory explicitly, it can be reconstructed as follows from their discussion:

Bridge Theory Warranting Inferential Step B

(a) The Neanderthals in question used the 'stuff and cut' method of eating: they put a tough bit of food into the mouth, clamped it between their front teeth, and used a stone tool (knife) to cut off the bit they would then chew.
(b) The edge of the knife came into contact with the labial faces of their incisors and canines, making scratches in them.
(c) The scratches in these teeth angle from top-left to bottom-right, reflecting the direction of the cutting and, specifically the fact that Neanderthals did the cutting with the right hand.

The question now is: 'How tenable is this bridge theory?' As far as I know, its claims have not been successfully challenged in the literature. Jennifer Bax and Peter Ungar (1999: 190) had contended earlier that similar claims are not borne out by wear features in the incisors of modern hunter-gatherers. More specifically, they claimed not to have found any evidence of 'stuff and cut' scratches on the incisors of sixty-six modern hunter-gatherers belonging to four groups: the Aleut, Arikara, Illinois Bluff and Puye. And so, they concluded that there is no relationship between scratch orientation and the use of a particular hand. This conclusion, however, has been challenged on various grounds in the literature. For instance, Lozano et al. (2009: 373) argue that the scratches described by Bax and Ungar are not comparable in form to those on Neanderthal teeth. The scratches in the teeth of the modern hunter-gatherers concerned are likely, they believe, to be the result of their dietary habits, made by the kinds of food habitually eaten by these people. This indicates to Lozano et al. that these scratches are unrelated to those left by stone-tool cutting. On the basis of the work by Lozano et al. and by other investigators, Frayer et al. (2012: 194) consequently reject the criticism of Bax and Ungar of their bridge theory. At this juncture, then, inferential step B may be judged to satisfy the Warrantedness Condition.

2.4.2 The Questionable Step from Right-Handedness to Left-Lateralisation

Consider again the final component of the scratched-teeth inference: the simple inference represented by GHI in Figure 2.2. Recall that in Section 2.2.we have seen that the conclusion, I, fails the Pertinence Condition in being about an obscure entity. The present section considers a further reason for doubting the soundness of inference GHI: inferential step H proceeds from the conclusion G – that European Neanderthals' brains were left-lateralised like living humans – which has been reached by means of the suspect inferential step F. In explaining why this inferential step is deemed suspect, I provide a further illustration of the important role played by the Warrantedness Condition in the appraisal of window inferences about Neanderthal language.

Proceeding from their conclusion E that European Neanderthals were right-handed (like modern humans), Frayer et al. arrive by way of the inferential step F at the conclusion G that these Neanderthals had left-lateralised brains similar to modern humans. To warrant F, they take over from the literature claims about the links between handedness, lateralisation and language – claims such as the following:[10]

Claimed Links between Handedness, Lateralisation and Language

(a) 'Most neurologists and paleoneurologists accept the relationship between language, lateralization and handedness (e.g. Knecht et al. 2000; Falk, 1987).' (Frayer et al. 2010: 122)

(b) 'Right-handedness is long known to be highly correlated with left cerebral dominance and language (e.g., Chance and Crow, 2007; Frost, 1980; McManus, 2004; Stubbe-Dräger & Knecht, 2009.' (Frayer et al. 2010: 122)

On the basis of claims such as these, Frayer et al. construct the following warrant for inferential step F:

Warrant for Inferential Step F

Demonstration of right-handedness in Neandertals and their European precursors is strong evidence for lateralization in these humans. (Frayer et al. 2010: 122)

The question now is : 'How adequate is the bridge theory by which this warrant needs to be underpinned?' Referring to an early publication by Holloway and de la Costa-Laremondie (1982), Frayer et al. note that no obligatory relationship exists between handedness and cerebral lateralisation. The various ways in which this relationship is complex are explored in some detail in a large body of recent work. Drawing on this work, Benítez-Burraco and Longa are critical of Frayer et al.'s construal of the significance of this relationship:

> . . . the relationships between right-handedness, (structural and functional) brain lateralization and language are perhaps not significant enough, or illuminating from an evolutionary perspective. (Benítez-Burraco and Longa 2012: 187)

In support of this judgement, Benítez-Burraco and Longa cite facts about the complexity of the relationship between left-lateralisation and right-handedness such as the following:

Facts about the Relation between Handedness and Lateralisation

(a) '. . . there is not a significant association of language proficiency with variations of lateralization regarding hand-preference and hand-skill.' (Natsopoulos et al. 2002: 187)

(b) In about 30 per cent of left-handed people, the cortical areas related to linguistic processing are not lateralised to the left hemisphere. (Foundas et al. 2002)

(c) Left-handed people do not show qualitative differences concerning structural aspects of language. (Foundas et al. 1994)
(d) Left-handed people do not show a greater prevalence of specific impairments. (Bishop 2001)

These facts are in line with the more recent conclusion drawn by Metten Somers (2015) in his thesis that 'handedness and lateralization are not related as has been assumed thus far'. Thus, he and his research associates have found amongst other things that in the case of left-handed individuals, the degree of hand preference cannot serve to predict the degree of language lateralisation (2015: 11). In the case of healthy right-handed individuals, Knecht et al. (2000: 74) find in earlier work that right-hemisphere language dominance is 'considerably more common than previously suspected'. This finding is echoed in a later review by Baynes and Long (2007: 187), who state that 'right-handers can be right-hemisphere dominant for language'.

The question, then, is 'To what extent do the facts cited by Benítez-Burraco and Longa as well as other authors weaken the warrant for Frayer et al.'s inferential step F?' Regrettably, Frayer et al. (2012) do not address this question in their response to Benítez-Burraco and Longa's (2012) critique. It could be observed, for instance, that nearly all the facts cited by Benítez-Burraco and Longa are about left-handedness and so may not have a direct bearing on what is at issue to Frayer et al.: the strength of the link between right-handedness and left-lateralisation. Furthermore, it could be noted that the link between right-handedness and left-lateralisation at issue is claimed to exist at the population level, and as such has not been questioned in the literature.[11]

All in all, the warrant for inferential step F has come in for criticism that is yet to be rebutted by Frayer et al. In attempting this, they should factor in the distinction between manipulative and communicative actions (Cochet and Byrne 2013; Vauclair and Cochet 2013). As for the relevance of this distinction, Cochet and Byrne observe that:

> Researchers have long tried to draw a parallel between left-hemispheric dominance for language and the strong population-level right-hand bias for object manipulation in humans. However, it has been shown that the direction of handedness for manipulative actions is not a good indicator of hemispheric dominance for speech. The left cerebral hemisphere is dominant for language in right-handers (96 %, Knecht et al. 2000; Pujol et al. 1999), but also in majority of left-handers (73 %, Knecht et al. 2000; 76 % Pujol et al. 1999). By contrast, there may be a more direct relationship between handedness for gesture and hemispheric dominance for language (Kimura 1973). (Cochet and Byrne 2013: 535)

The right-handed cutting actions attributed to the Neanderthals at issue clearly fall into the category of manipulative actions, a troublesome complication for Frayer et al.'s reasoning.

2.4.3 *The Unsound Step from Left-Lateralisation to 'Modern Linguistic Capacities'*

Which brings us to the soundness of the inferential step represented by H in Figure 2.2. This inferential step is unsound, failing the Warrantedness Condition. The warrant required for this step needs to license inferring the presence of certain cognitive capacities of European Neanderthals – so-called modern linguistic capacities – from a feature of their brains – specifically, left-lateralisation (claimed to be reflected by right-handedness). To be able to do this, this warrant needs to be underpinned by a bridge theory that gives an empirical account of how modern language is based in the brain, i.e., of how linguistic capacities or functions supervene on brain structures. But exactly how and where language is based in the brain structures of modern humans is a complex matter, only partly understood at present.[12] So, one would expect Frayer at al. to invoke a well-articulated bridge theory to underpin inferential step H. In this regard, however, they make only general claims such as the following, to which they append a few references, without explaining why they are to be considered uncontentious and enlightening:

> for the most part language is strongly left cerebrally lateralized in both sexes. (Frost et al. 1999; Sommer & Kahn , 2009) (Frayer et al. 2010: 122)

> Most neurologists and palaeoneurologists accept the relationship between language, lateralization and handedness. (e.g. Knecht et al. 2000; Falk 1987) (Frayer et al. 2010: 122)

It is accordingly unsurprising that Frayer et al.'s locating of most of language in left-hemisphere brain areas has come in for serious criticism. Thus, drawing on a range of facts about the relation between language and the brain, Benítez-Burraco and Longa observe, contra Frayer et al., that:

> language does not crucially depend on a specific pattern of structural and functional lateralization of the brain regions that contribute to linguistic processing, but mainly on a specific interconnection program that links some neuronal devices functionally. (Benítez-Burraco and Longa 2012: 188)

In support of this observation, Benítez-Burraco and Longa (2012: 188–89) cite facts such as the following:

Facts Conflicting with a Strong Left-Lateralisation Position

(a) Language processing crucially involves subcortical structures in the right hemisphere, including the caudate nucleus and basal ganglia.[13]
(b) As message complexity increases, a progressive recruitment of other cortical areas occurs, including several areas of the right hemisphere: this reflects a growing demand on verbal working memory capacity.[14]
(c) In the case of pathological conditions, linguistic functions can be transferred to the right hemisphere without being substantially affected.[15]

The gist of such facts about the wide distribution of language functions across various brain areas is nicely captured in the following statement by Wendy Wilkins:

> It's not just Broca's area and Wernicke's area; it is not just the left hemisphere (see, e.g., Baynes and Gazzaniga 2005). It is probably also not even just the neocortex (see, e.g., Lieberman 2007). The language 'organ' is widely distributed in the human brain. (Wilkins 2007: 476)

Facts such as those cited by Wilkins and by Benítez-Burraco and Longa show that the bridge theory held by Frayer et al. cannot warrant their inferential step H. Even if it could be shown that Neanderthals had left-lateralised brains, it would not follow that they had linguistic capacities similar to those of living humans. For them to have had the latter capacities, their brains would also have had to exhibit the other features that play a role in the processing of modern language. These include features such as those mentioned by Benítez-Burraco and Longa and alluded to by Wilkins. Left-lateralisation, in short, is not a sufficient condition for having modern linguistic capacities. Oddly, Frayer et al. (2012) do not take up this point in their response to Benítez-Burraco and Longa's criticism of their position on Neanderthal linguistic capacities.

There are some additional facts indicating that the relation between handedness, lateralisation and language is quite complex from an evolutionary perspective. These facts include the following three. First, although language is (considered to be) unique to modern humans, lateralistion is ancient and occurs in a wide range of species, including various primate species and some avian ones (Papadatou-Pastou 2011: 253; Ocklenburg et al. 2013: 1; Vallortigara et al. 1999). This indicates that for a species to have language, it needs more than a lateralised brain. Second, although language is (considered to be) unique to modern humans, the right–left hemisphere asymmetry is not, occurring as it does in a wide range of species (Güntürkün 2009: 31). Consequently, having a right–left hemisphere asymmetry does not necessarily mean having language. Third, language is not the only domain associated with left-lateralisation: cognitive domains other than language also depend on left-lateralised processing. These domains include emotional processing, face and body perception, spiritual attention, fine motor skills and memory. The left hemisphere of brains, that is, is not exclusively used for processing language. It follows that the left hemisphere of Neanderthals may have subserved other, non-linguistic, functions.

In sum: Frayer et al.'s warrant for inferential step H does not have the factual support necessary for permitting the conclusion that European Neanderthals had linguistic capacities similar to those of modern humans. The inferential step concerned is unsound, failing the Warrantedness Condition.

2.5 Conclusion

To conclude this chapter, I return to a number of matters dealt with briefly in preceding sections. First, there is the main aim of these sections. It is to concretely set out the conceptual means with the aid of which the soundness of inferences about Neanderthal language can be assessed, *not* to exhaustively analyse and appraise Frayer et al.'s scratched-teeth inference.[16] I have accordingly refrained from analysing some of the components of this inference, including the simple inference CDE: the conclusion E that Neanderthals were right-handed like modern humans; the inferential step D which yields this conclusion; and the conclusion C in which this step is grounded. It is clear from the literature that determining the handedness or hand preference of prehistoric individuals and extinct populations such as Neanderthals is an undertaking in which complex conceptual, methodological and factual issues need to be addressed.[17] This goes well beyond the concerns of the present chapter and so I refrain from appraising the soundness of Frayer et al.'s simple inference CDE.[18]

Second, it is now possible to give a fuller account of the anatomy of window inferences. Recall that the structure of a simple, i.e., non-composite, inference has been portrayed as having a surface layer made up of three components: data or assumptions about a phenomenon other than language evolution, a conclusion about a facet of language evolution, and an inferential step by which this conclusion is drawn from those data or assumptions. The structure of such inferences is more complex, though, in that they have a second, deeper layer comprising the various theories needed for underpinning the three surface components (Botha 2016: 24–25). These theories are required by the three soundness conditions: a grounding theory to underpin the data or assumptions from which the inferential step departs; a bridge theory to underpin the inferential step; and one or more theories to underpin the conclusion at which the inferential step arrives. Depending on the phenomenon about which the conclusion expresses a claim, the latter theories include a linguistic ontology, a theory of processes of linguistic change such as evolution, theories of linguistic structure, meaning or use, as well as theories of other aspects of language. The skeletal representation of the anatomy of a simple window inference given in Figure 2.1 in Section 2.1 needs, accordingly, to be fleshed out as shown in Figure 2.3.

Third, from the discussion of the Pertinence Condition it is clear that the questions 'Did Neanderthals have language?' and 'If they did, what was it like?' cannot successfully guide a scientific investigation. Intriguing as they sound, these questions are too vague in a number of ways. On the one hand, the notion of 'language' needs to be replaced by a restrictively defined concept of 'language', 'language capacity' or the like drawn from a principled linguistic ontology.

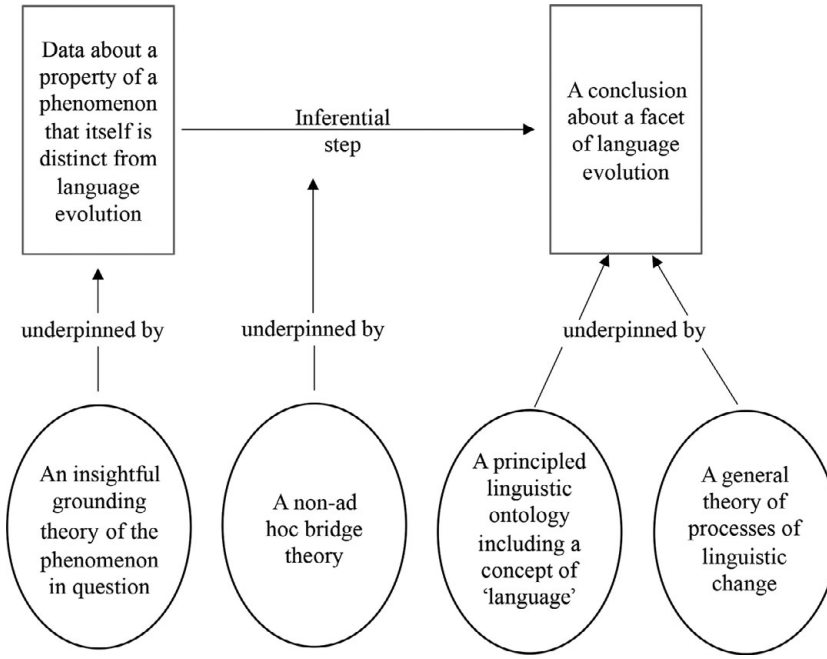


Figure 2.3 Two-layered structure of a simple window inference about language evolution

On the other hand, the notion of 'Neanderthals' is a similarly vague umbrella notion which should be replaced by one or more restrictive concepts of 'Neanderthals'. That is, having existed for hundreds of thousands of years and having been spread over an area of roughly 10 million square kilometres in Eurasia, there were Neanderthals and Neanderthals.[19] On respectable accounts, Neanderthals appeared as a species roughly 430,000 years ago, having evolved from *Homo heidelbergensis*, the ancestor of modern humans too.[20] Neanderthals disappeared as a species between roughly 41,000 and 39,000 years ago.[21] So, it cannot be simply assumed that all Neanderthals had the same cognitive capacities including linguistic attributes, engaged in the same behaviours, made the same artefacts and so on. As a consequence, the questions 'Did the earliest Neanderthals have language?' and 'Did the last Neanderthals have language?' may have quite different answers.[22] In sum, it is not possible to accurately characterise the so-called phenotype whose evolutionary status is at issue – so-called Neanderthal language – with the aid of non-restrictive instances of the notions of 'Neanderthals' and 'language'.

Fourth, the function of warrants can be further clarified with the aid of the tripartite distinction between data, facts and evidence. Conventionally, data

about a phenomenon, P, are taken to be bits of raw information about P. Data about P that have passed the test of accuracy are considered to be facts about P. And facts about P that bear in terms of an appropriate warrant on the correctness of a claim, C, about some phenomenon other than P are assigned the status of evidence for or against C. Evidence, in short, is data that have passed the tests of accuracy and relevance. And appropriate warrants are needed to convert (factual) data about one phenomenon into evidence bearing on claims about a different phenomenon.

Fifth, to further clarify the function of a bridge theory, such a theory is distinct from what is referred to as a 'midrange' or 'middle-range' theory. As employed by some archaeologists, a midrange or middle-range theory has the function of providing '. . . a bridging argument that connects what is observed in the archaeological record with reasonable interpretations of those observations' (Oxford Reference). The function of a bridge theory as a component of the Windows Approach, by contrast, is to underpin in empirical work the inferential step from data or assumptions about any phenomenon P to a conclusion about any other phenomenon *P* that is distinct from P. In the case of bridge theories, P may be something that is observed in the archaeological record, e.g., an artefact. But P is not restricted to what is observed in the archaeological record: P may also be a phenomenon that is not directly observed in the archaeological record, including handedness and lateralisation in the case of the scratched-teeth inference.

Sixth, consider again the conceptual foundations of the Windows Approach exemplified by the Groundedness Condition, the Warrantedness Condition and the Pertinence Condition. These foundations do not represent prescriptions imposed from the outside on work on language evolution and related other phenomena. These foundations are rather inherent to good empirical work on such phenomena – submerged under its surface, as it were. In regard to its roots, the Widows Approach may, accordingly, be considered to represent in a specific sense an immanent approach to making inferences in empirical work.

Part II

Symbolic Behaviours

As noted in Chapter 1, recent accounts portray Neanderthals as people who engaged in a range of complex behaviours that are similar or comparable to those of their modern or near-modern human contemporaries.[1] A particular form of complex behaviour attributed by archaeologists to so-called late Neanderthals is considered especially significant: their alleged use of symbols, symbolic behaviour, symbolically organised behaviour or symbolically mediated behaviour.[2] That is, this form of behaviour has widely been taken as providing the best indication of whether these Neanderthals had language and, accordingly, were behaviourally and cognitively modern humans (d'Errico et al. 2003: 17; Garofoli 2015: 80; Nowell 2010: 441).[3]

The symbolic behaviour attributed to some Neanderthals was allegedly manifested in, amongst other things, their:

- using black pigment to decorate their bodies (Soressi and d'Errico 2007: 8; Stringer 2011: 163; Zilhão et al.: 2010: 1027), and to draw linear designs on animal skins with the aid of intentionally shaped pointed crayons at the French cave site of Pech de l'Azé (d'Errico and Soressi 2002: A13; Soressi and d'Errico 2007: 8; Zilhão 2011: 121);
- decorating bone tools such as awls (Caron et al. 2011: 1; Zilhão 2006 et al.: 12643);
- manufacturing and wearing personal ornaments or 'jewellery' from objects such as marine shells, raptor talons, raptor feathers and perforated animal teeth (Caron et al. 2011: 1; Conard 2015: 2494; d'Errico and Vanhaeren 2009: 37–38, 2011: 1; d'Errico et al. 2003: 17; Hublin et al. 1996: 224, 2012: 18748; Morin and Laroulandie 2012: 1; Peresani et al. 2011: 3893; Radovčić et al. 2015: 1; Romandini et al. 2014: 2; Straus 2009: 8; Soressi et al. 2013: 14186; Stringer 2011: 165–66; Vanhaeren 2005: 541; Zilhão 2006: 183, 2007: 1; Zilhão et al. 2010: 1023, 1027);
- producing abstract or non-figurative art in the form of:
  - an abstract ('hashtag') engraving in Gorham's Cave, Gibraltar (Rodríguez-Vidal et al. 2014: 13305; Rendu in Burgen 2014; Taçon in Jordans 2014);
  - red disks (also called 'dots') and hand stencils on the walls of El Castillo Cave in Spain (d'Errico et al. 2016: 50; Garcia-Diez et al. 2015: 145–46; Pike et al. 2012: 1409; Zilhão et al. 2017: 38);

  - a red hand stencil in Maltravieso Cave, Extremadura, Spain (Hoffmann et al. 2018a: 913);
  - a red scalariform ('ladder-shaped') sign in the La Pasiega Cave, Cantabria, Spain (Hoffmann et al. 2018a: 913);
- deliberately burying the dead (Nowell and d'Errico 2007: 21; Gamble et al. 2014: 172ff.; Harvati 2015: 2260; Papagianni and Morse 2015: 115; Pettitt 2011a, 2011b; Rendu et al. 2014: 81, 85; Straus 2009: 7–8; Stringer 2011: 86, 149–150, 212);
- caring for the wounded and disabled, remains of some of whom were found at sites such as the Shanidar Cave in the Bradost Mountain in Iraq, and the Sima de los Huesos ('Pit of Bones'), a section of a cave system in the Atapuerca Mountains in northern Spain (Stringer 2011: 147–49; Wynn and Coolidge 2012: 16).

Whether Neanderthals did or did not act symbolically when they engaged in these behaviours has been a highly controversial matter,[4] and there is consensus about the symbolic status of very few, if any, of these behaviours. These points will be amply documented in following chapters.

The question here is: 'How have these putative forms of symbolic behaviour been brought to bear on the idea that the Neanderthals concerned had language?' The answer is, in essence: 'With the aid of a chain of inferences of which the following two steps are the essential ones:'

> *First inferential step:* Since there is no direct evidence about symbolic behaviour, it being an unrecorded prehistoric phenomenon, this step cannot start from such behaviour. It starts instead from data about material objects believed to have been associated with some Neanderthals who inhabited specific caves or shelters. These material objects include marine shells, raptor talons and perforated animal teeth; blocks of pigment; scratches and coloured markings on walls of caves; objects presumably intentionally buried along with Neanderthal remains and so on. In terms of the first step, it is inferred from data about these objects that they were used as symbols by the Neanderthals concerned, i.e., that these Neanderthals engaged in symbolic behaviour.
>
> *Second inferential step:* Starting from the conclusion that the Neanderthals under discussion behaved symbolically, the second inferential step yields the further conclusion that they had language.[5]

As we proceed, this inference will be seen to include additional inferential steps that reflect differences between (i) the kinds of objects claimed to have been associated with some Neanderthals and (ii) the forms of symbolic behaviour attributed to them.

In Part II of this book, I appraise the soundness of inferences about Neanderthal language that have been drawn by some respected scholars from four of the forms of symbolic behaviour in which some Neanderthals allegedly engaged: their manufacturing and wearing personal ornaments (Chapter 3), producing cave art (Chapter 4), decorating their bodies (Chapter 5) and burying the dead (Chapter 6). In view of the importance assigned by archaeologists to the manufacturing and wearing of personal ornaments as proxies for language, Chapter 3 forms the core of Part II, in terms of size as well. For the sake of brevity, I will refer to this inference as the 'symbolic-behaviour inference'. It will be seen to serve as a template for a family of inferences that includes, among others, the jewellery inference (Chapter 3), the cave-art inference (Chapter 4), the body-decoration inference (Chapter 5), and the deliberate-burial inference (Chapter 6).

3 Making and Wearing Personal Ornaments

3.1 The Jewellery Inference

Personal ornaments have been considered by some to be one of the most important archaeological sources of evidence about modern cognitive abilities, including symbolism and language. Thus, in the view of Francesco d'Errico et al. (2003: 17), '[d]epictions or abstract representations and personal ornaments are generally accepted as archaeological expressions of modern cognitive abilities, and evidence for the acquisition of articulate oral language (Aiello, 1998; Davidson and Noble, 1989; Deacon, 1997; Mellars, 1996a, b; Noble and Davidson, 1989; Stringer and Gamble, 1993).' More recently, d'Errico (2009: 108) has restated this view in an even stronger form, asserting that '[a]bstract or depictional representations and personal ornaments are the only unquestioned evidence of the emergence of symbolism'. Lyn Wadley (2001: 203) seems to share this view, observing that '[p]robably all archaeologists are agreed that the presence of art and personal ornaments represents symbolic and therefore culturally modern behaviour'. In the light of views such as these, the inferences that have been drawn about Neanderthals' symbolism and language deserve special scrutiny.

Central to these inferences, is an inference that may be dubbed 'the jewellery inference'. Its structure includes three inferential steps:

Three Steps in the Jewellery Inference

First step: It starts from data about 'raw', uninterpreted, material objects – marine shells ivory rings, perforated or grooved animal teeth, as well as raptor talons and phalanges – allegedly associated with some Neanderthals who inhabited specific archaeological sites, i.e., specific caves and shelters. It ends with the conclusion that these objects were made and worn as personal ornaments – 'beads', 'pendants' and 'jewellery' – by these Neanderthals.

Second step: Starting from the conclusion that the objects at issue were made and worn as personal ornaments by the Neanderthals concerned, this step yields the further conclusion that the personal ornaments were treated by these Neanderthals as symbols.

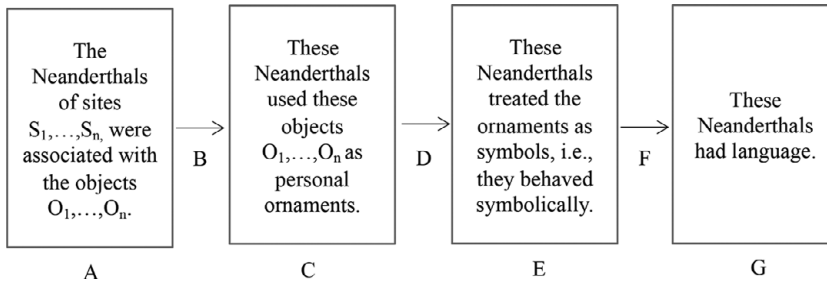


Figure 3.1 The jewellery inference

Third step: The conclusion that the personal objects were treated by the Neanderthals concerned as symbols forms the point of departure of the third inferential step, which ends with the further conclusion that these Neanderthals had language.

Schematically, the structure of the jewellery inference is shown in Figure 3.1.

As for the simple inferences from which the jewellery inference is composed, I will henceforth refer to ABC as 'the personal-ornament inference', to CDE as 'the symbol inference' and to EFG as 'the language inference'. Having set out in Section 3.2 the major doubts that have been expressed in the literature about the soundness of the jewellery inference, I devote subsequent sections to an appraisal of its components. Whereas Sections 3.3 and 3.4 focus on the soundness of the personal-ornament inference ABC, Section 3.5 examines the soundness of the symbol inference CDE. The soundness of the language inference EFG is the topic of a separate full chapter, Chapter 7.

3.2 Major Doubts about the Inference

The soundness of the jewellery inference has been the topic of spirited, ongoing disagreement. So, let us consider the major doubts that have been expressed about it, doubts which, if correct, would undermine the soundness of this inference. Boiled down to essentials, these doubts may be stated as follows:

Major Doubts About the Soundness of the Jewellery Inference

(a) The material objects concerned – e.g., marine shells, raptor talons, etc. – (i) were not associated with Neanderthals or (ii) were associated with them but not in the 'right' way.
(b) The objects concerned were associated with Neanderthals but not as ornaments worn for personal adornment.

(c) The objects concerned were worn by Neanderthals as personal ornaments but did not have the status of symbols.
(d) The objects concerned may have been Neanderthal symbols but this does not imply that Neanderthals had language.

So let us consider the specifics of these doubts.

3.3 The Link between Neanderthals and Marine Shells, Raptor Talons, etc.

Doubts (a)(i) and (a)(ii) are about the adequacy of the factual grounding of the first inferential step – represented by B in Figure 3.1 – in the personal-ornament inference. As regards (a)(i), for this inference to be properly grounded, marine shells, raptor talons and the other objects concerned need to have been associated with Neanderthals and not with another hominin species. This point is illustrated by the controversy about whether the allegedly ornamental and other objects found at the Grotte du Renne ('Reindeer Cave') were indeed associated with Neanderthals who inhabited the cave. The Grotte du Renne, after all, is taken by Higham et al. (2010: 20234) to be '... of great importance because it provides the most persuasive evidence for behavioral complexity among Neanderthals'. In similar vein, Stringer (in Callaway 2012: 5) describes the cave as 'the flagship for the idea that Neanderthals had symbolic behaviour'. Appenzeller (2013: 303), in turn, assigns this cave the status of '... exhibit A in the case that Neanderthals, like ourselves, trafficked in symbols, using ornaments as badges of identity for individual groups'.

3.3.1 At Issue: The Very Existence of a Link at The Grotte du Renne

Located at Arcy-sur-Cure in Burgundy, central France, the Grotte du Renne was discovered in 1949 by the French archaeologist André Leroi-Gourhan and excavated by him over a fifteen-year period (Movius 1969: 112). As described by d'Errico et al. (1998: S4) and Zilhão (2013: 26), the finds made in levels (alternatively referred to as 'layers') VIII, IX and X of the cave include the following objects:

Objects Recovered in The Grotte du Renne
1 juvenile temporal bone,
29 teeth 'of undisputed Neanderthal affinities',
39 'objects of personal ornamentation', including perforated or grooved teeth of various animals, small perforated beads made of ivory, and a fossil shell (See Image 3.1),
1,615 'pigment chunks ... mostly red ochre' and

Image 3.1 Pierced and grooved body ornaments (pendants) from the Grotte du Renne attributed to Neanderthals
(photo courtesy Marian Vanhaeren and Michèle Julien)

139 'worked bone items of diverse typology; mostly awls but also projectile points, pins, burnishing tools and ivory *baguettes'* (See Image 3.1).[1]

The very existence of a link between the Neanderthal skeletal remains and the other objects recovered in the Grotte du Renne has been the topic of vigorous debate.[2] At the centre of the controversy, more specifically, is the issue of whether the Neanderthals who inhabited the cave created and wore the 'objects of personal ornamentation' and manufactured the bone tools listed above. The view that they did indeed do this has been strongly defended by Francesco d'Errico, João Zilhão, Jean-Jacques Hublin, François Caron, Matthew Collins and their research associates.[3] Equally strong doubts about the existence of such a link have been expressed by, amongst others, Paul Mellars, Ofer Bar-Yosef, Jean-Guillaume Bordes, Thomas Higham, Yvette Taborin, Randall White and their colleagues.[4]

What, then, are the grounds for doubting the existence of the link at issue? The two important ones to be considered below are about (i) the stratigraphic integrity of the levels of the Grotte du Renne in which the finds were made and (ii) the dating of these finds.

3.3.1.1 Mixed Levels? There are doubts about whether all the objects recovered in levels XIII, XI and X of the Grotte du Renne – the Châtelperronian levels – originated in these levels. So what are these levels? The Châtelperronian is portrayed as a Neanderthal-associated Palaeolithic stone-tool industry found in south-western France and northern Spain (Zilhão et al. 2006: 12643).[5] It lasted from roughly 45,000 to about 33,000 years ago (Higham et al. 2014: 306). The stone tools taken to be distinctive of this industry are

blades with a backed point. Châtelperronians made these blades from cores described as 'large, thick flakes or small blocks and plaquettes which were purposefully shaped by the production of a crest along a smooth, long surface' (d'Errico et al. 1998: S13; Coolidge and Wynn 2004: 55). The Châtelperronian industry was preceded by the Mousterian industry, which lasted from roughly 250,000 to 40,000 years ago, and was primarily associated with the Neanderthals. The Châtelperronian was followed by the Aurignacian industry, which lasted from roughly 43,000 to 26,000 years ago. This sequence of industries is represented by the levels of the Grotte du Renne: the Châtelperronian levels VIII, IX and X are underlain by the Mousterian levels XI–XIV, and overlain by the Proto-Aurignacian level VII (Zilhão 2013: 26).

At issue, then, is whether the ornaments and bone tools found in the Châtelperronian levels of the Grotte du Renne really belonged to the Neanderthals who occupied the cave. It has been claimed that these artefacts and the Neanderthal skeletal remains ended up in the same layers accidentally as the result of post-depositional events that disturbed the stratigraphy of the cave. These disturbances, it is contended, may well have displaced (i) the Neanderthal remains upwards from the underlying Mousterian levels to the Châtelperronian levels and (ii) the ornaments and bone tools downwards from the Proto-Aurignacian level to the Châtelperronian levels. The contention is that, if these displacements did indeed occur, the ornaments and bone tools were not made by Neanderthals but by Proto-Aurignacian modern humans who occupied the Grotte du Renne after Neanderthals (Zilhâo 2013: 26).

The question, then, is: 'How tenable are the doubts about the stratigraphic integrity of the Châtelperronian levels of the Grotte du Renne?' In an early article, d'Errico et al. (1998: S5–S8) argue at length that the doubts framed in terms of post-depositional disturbances cannot be sustained.[6] If such disturbances occurred, they argue, one would expect events such as the following to have occurred: (i) mixing between the Aurignacian level and the underlying Châtelperronian levels including level VIII (p. S7); (ii) intrusion of lithic artefacts characteristic of the Aurignacian into Châtelperronian levels (p. S7); and (iii) declining numbers of bone tools and personal ornaments in the Châtelperronian levels VIII–X (p. S8). d'Errico et al. (1998), however, assert that these expectations are not borne out by the (then) available evidence.

Doubts about the stratigraphic integrity of the artefact assemblages discovered in the Grotte du Renne have, nevertheless, persisted. This is evidenced by doubts expressed by, amongst others, Bar-Yosef (2006), Bar-Yosef and Bordes (2010), and White (2001). Caron et al. (2011: 1–2) capture the gist of their doubts as follows: (i) since no investigation of potential refitting of stone tools across levels has been carried out, 'the extent to which the Grotte du Renne sequence was affected by post-depositional disturbance cannot be

assessed'; (ii) 'the fact that some ornament types present in the Châtelperronian sequence (e.g., pierced fox teeth) are common in later Early Upper Paleolithic (EUP) technocomplexes raise the possibility that the symbolic artifacts found in the Châtelperronian are intrusive from above'; (iii) 'as the habitation structures built by the first Châtelperronian occupants of the site conceivably disturbed the underlying Middle Paleolithic levels (XI–XIV), the Neandertal remains recovered in levels VIII–X could be intrusive from below'.[7]

Caron et al. (2011: 7) have provided additional evidence taken to rebut 'the notion that the association of symbolic artifacts with Neandertals at the Grotte du Renne results from large scale localized or small scale generalized displacement of artifacts and human remains'. They derive this evidence from a comparison of the distribution of ornaments, bone tools, colourants, pigment processing tools and human teeth with that of diagnostic stone tools. These diagnostic tools include Levallois flakes (Mousterian), Châtelperron points and convergent sidescrapers (considered characteristic of the site's Châtelperronian objects), and also Dufour bladelets and their unretouched blanks (Proto-Aurignacian). On the basis of the results of this comparison, the authors determine whether the observed vertical and horizontal distribution patterns can be derived by the alleged post-depositional disturbance. Judging this not to be possible, they conclude that the association between Châtelperronian points, personal ornaments, bone tools, colourants and Neanderthal remains recovered at the Grotte du Renne is genuine.

3.3.1.2 Dubious Dates? It has been claimed that confusion about the precise age of objects recovered in the Châtelperronian levels of the Grotte du Renne gives rise to doubts about the cave's stratigraphic integrity. In this regard, Higham et al. (2010: 20234–35) observe that previous radiocarbon dating of objects recovered at the Grotte du Renne has resulted in a wide range of ages covering 45,000–28,000 B.P. with little stratigraphic consistency. They therefore believe that questions remain about which of these dates are accurate and whether those that appear aberrant are due to reasons of sample contamination or postdepositional mixing of material. As they see it, one useful way to address the matter of the stratigraphic integrity of the Grotte du Renne is with a series of well-selected radiocarbon dates from a succession of archaeological strata. Accordingly, they took samples for radiocarbon dating from fifty-nine pieces of humanly modified material from levels V to XII of the cave. These include cut-marked bones, horse teeth smashed by humans, bone points or awls, ornaments made of animal teeth, and mammoth ivory tusks. The results of their dating '. . . confirm that material from several contexts has moved both up and down the stratigraphic sequence into the Châtelperronian levels' (Higham et al. 2010: 20239). For instance, on Higham et al.'s analysis Aurignacian-aged material is present in the Châtelperronian levels. The

evidence of their dating, they (2010: 20239) conclude, '... necessarily raises questions regarding the confidence we ascribe to the context of material within this site and, importantly, the widely accepted association between the Châtelperronian and the Neanderthal remains'.

The results of Higham et al.'s testing along with the conclusion they draw from them have elicited widely diverging responses. Thus, on the one hand, in the view of Mellars (2010: 20147) '[t]he PNAS article by Higham et al. ... has now thrown substantial doubt on these anatomical and cultural associations at the Grotte du Renne site'. Going even further, Mellars (2010: 20148) maintains that 'the central and inescapable implication of the new dating results [of Higham et al. – R.B.] from the Grotte du Renne is that the single most impressive and hitherto widely cited pillar of evidence for the presence of complex "symbolic" behaviour among the late Neanderthal populations in Europe has now effectively collapsed'.

On the other hand, Hublin et al. (2012: 18747) have conducted new radiocarbon dating of forty bone samples from layers XI–VII of the Grotte du Renne, obtaining measurements that '... are at odds with [Higham et al.'s – R.B.] previous radiometric measurements on the same sequence'. On radiometric grounds, Hublin et al. (2012: 18747) '... find no evidence to support the previous arguments for major movements of material occurring between archaeological layers at the Grotte du Renne in the section of the site between the cliff and talus, the area which yielded the bulk of the archaeological material'. In their view, the high degree of intralayer variation in the radiometric ages found by Higham et al. '... results not from layer admixture but rather from the sample of selection criteria'. Fleshing out this view, Hublin et al. (2012: 18747) observe that the emphasis put by Higham et al. on '... directly dating anthropogenically modified bones, including bone tools and body ornaments, may at times have biased the sampling toward poorly preserved bones'. To Hublin et al. (2012: 18748), 'the most parsimonious hypothesis remains that Neandertals were the makers of the CP [i.e., the Châtelperronian – R.B.]'. This view, they note, is also in line with the direct date of a partial skeleton of a young adult male Neanderthal discovered in 1979 at a site near Saint-Césaire in south-western France. Significantly, this skeleton was found in association with tools and other artefacts belonging to the Châtelperronian industry (Stringer 2011: 87).

Additional dating evidence bearing on the controversy about the Neanderthal-Châtelperronian association at the Grotte du Renne comes from work reported by Welker et al. (2016). From the Châtelperronian layer X of the cave, they (2016: 11162, 11166) identified twenty-eight additional hominin specimens, these being probably skeletal remains of a single infant. They obtained from them molecular (ancient DNA, ancient proteins) and chronometric data that demonstrated, on their analysis, that the hominins involved

were Neanderthals who date to the Châtelperronian. Welker et al. (2016: 11166), moreover, tested the hypothesis that the hominin specimens derive from the underlying Mousterian layer. According to their chronometric data, this hypothesis should be rejected. In effect, therefore, they have ruled out the possibility that these remains moved from the latter layer into Châtelperronian layer X. In sum, Welker et al.'s (2016: 11166) '. . . biomolecular data provide evidence that hominins contemporaneous with the Châtelperronian layers have archaic nuclear and Neanderthal mitochondrial ancestry'.

How strong, then, are the doubts about the grounding of the first inferential step, B in Figure 3.1, in the personal-ornament inference in data about the association between the Neanderthal remains recovered in the Châtelperronian levels of the Grotte du Renne and the ornamental objects and bone tools found in these levels? At this stage of what is still an ongoing debate, these doubts seem to have been countered by the work discussed above. That the debate is an ongoing one is evidenced, for instance, by Higham et al.'s (2011) rejection of Caron et al.'s (2011) criticisms of the radiocarbon dates that Higham et al. (2010) attribute to bones teeth and artefacts from pertinent levels of the Grotte du Renne. Futhermore, Callaway (2012: 5) announced that Zilhão 'is drafting another response' to Higham et al.'s (2011) attempted rebuttal.

3.3.1.3 Evidence from Cueva de los Aviones and Five Other Sites It needs to be noted that the grounding of the ornament inference does not depend solely on the finds made at the Grotte du Renne. That is, it has been argued that finds made at other sites provide independent evidence for associating Neanderthals with putatively ornamental objects. Now, let us consider six instances of such finds.

1 *Marine shells from Cueva de los Aviones*: Zilhão et al. (2010: 1023) present 'secure evidence' derived from finds made at a site in south-east Spain – Cueva de los Aviones – indicating that the behaviour of Neanderthals was already 'symbolically organized' about 50,000 years ago. The finds include pigment-stained, perforated cockle and scallop shells and lumps of yellow and red colourants of the kind that is widely accepted as evidence of body ornamentation (See Image 3.2). They point out that the finds date back to 10,000 years before modern humans are first recorded in Europe. This means, in the opinion of Zilhão et al. (2010: 1027), that 'the notion of later intrusions is an oxymoron – the association of this material with Neanderthals is, literally, rock-solid'.[8] According to more recent U-series dating done by Hoffmann et al. (2018b: 1, 4), the finds made at Cueva de los Aviones are significantly older.[9] Thus, Hoffmann and his co-authors date them to between 115,000 and 120,000 years old. Thereby, they are claimed to predate the presence of modern humans in the area by 20,000–40,000 years.

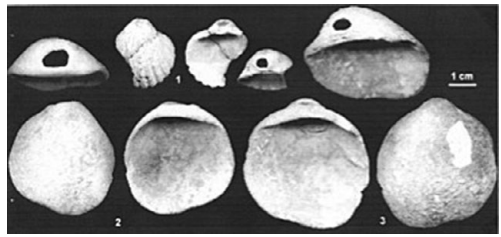


Image 3.2 The perforated marine shells from level II of Cueva de los Aviones (Zilhão et al. 2010: 1025)

Image 3.3 A left talon of a white-tailed eagle recovered at Krapina. Shown are a highly polished area (a) and two cut marks (arrow) above it (Radovčić et al. 2015: 5)

2 *Raptor talons from Krapina*: On an account by Radovčić et al. (2015: 1), eight talons of white-tailed eagles recovered at the Krapina site in present-day Croatia date to about 130,000 years ago. These talons, that is, come from the Mousterian period and from a site that is independently known as one occupied by Neanderthals. On Radovčić et al.'s (2015: 2, 7–8, 11) analysis, four of these talons show cut marks: straight, deep V-shaped grooves. Located on the proximal aspects of the talon, the cut marks have smoothed edges and small polished facets (See Image 3.3). These features suggest to Radovčić et al. (2015: 2) that, as a unit, they were worn 'probably as a necklace or some other kind of jewelry'.

3 *Eagle phalanges from Combe-Grenal and Les Fieux*: Morin and Laroulandi (2012: 1, 4), likewise, argue that Neanderthals used skeletal parts of large raptors for 'symbolic purposes'. Described as 'terminal phalanges' of eagles, these parts were recovered at Combe-Grenal in the Dordogne region of France and at Les Fieux, a cave site in south-western France, in stratigraphic units dated to about 60,000–40,000 years ago, that is to the Middle

Palaeolithic. The cut marks are on the claw of eagles, which are inedible and so 'not compatible with human consumption', a fact that 'argues against their utilization in strictly non-symbolic contexts', according to Morin and Laroulandi (2012: e32856). That is, as suggested by similar objects found in other Middle Palaeolithic contexts in France and Italy, they were used instead as a 'means of symbolic expression'.

4 *Raptor claws from Rio Secco Cave and Mandrin Cave*: Interesting cut-marked raptor claws were found in Mousterian layers in the Rio Secco Cave in north-east Italy and Mandrin Cave in the Middle Rhône valley in France. On an analysis by Romandini et al. (2014: 1), these claws were found in contexts not younger than 49,100–48,000 years in the case of the Rio Secco Cave, and in contexts dated to around 50,000 years ago in that of the Mandrin Cave. A particularly noticeable clue, according to Romandini et al. (2014: 8), is that all the cut-marked claws found in Middle Palaeolithic sites come from eagles, which they take to argue against 'their utilization in strictly non-symbolic contexts'. The use of such a claw as an ornamental element, they assert, could take different forms that are still difficult to detect because of, amongst other things, the lack of diagnostic wear or traces of ochre or other colouring material on its surface. However, Romandini et al. (2014: 9) go on to observe that, because of their top position in the trophic chain, eagles and large raptors are amongst the rarest birds in nature. Following Finlayson et al. (2012), they suggest that this '. . . may indicate that these large and powerful diurnal birds attracted hominins and stimulated their use as a symbolic media [sic] by Neanderthals, joining a universal trait of sub-actual societies'.

5 *Wing bones from Grotta di Fumane*: Feathers of large raptors were also used by Neanderthals for an ornamental purpose, if Peresani et al. (2011: 3893) have got it right. Six-hundred-and-sixty bones belonging to twenty-two species of birds were excavated in the final Mousterian levels, dated from 44,800 to 42,200 years ago, in Grotta di Fumane, northern Italy. A microscopic analysis of the surfaces of a number of wing elements reveals cut marks indicating, according to Peresani et al. (2011: 3893), the intentional removal of large feathers by Neanderthals. The unusual placement of the human modifications of the bones concerned is seen by them (2011: 3888) as '. . . an activity linked to the symbolic sphere and the behavioral modernity of this European autochthonous population'. They observe, moreover, that similar bone elements are absent from the earliest Aurignacian levels in the Grotta di Fumane. They (2011: 3893) conclude by expressing the judgement that the Fumane evidence on the ornamental exploitation of the feathers of large raptors and other birds '. . . strengthens the contention that the Grotte du Renne's associations [of Neanderthal skeletal remains with putative ornamental objects and bone tools – R.B.] are genuine'.

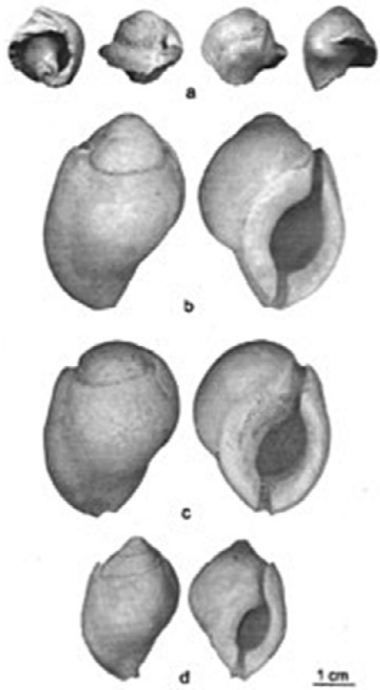


Image 3.4 *Aspa marginata* shells from the Mousterian of Fumane Cave, Italy (Peresani et al. 2013: 3)

6 *An ochered fossil marine shell from Fumane Cave*: A study by Peresani et al. (2013) reports the find of a fragmentary ochered gastropod shell of the species *Aspa marginata* in a Mousterian layer, dated to at least 47.6–45.0 cal ky BP, of the Fumane Cave (See Image 3.4). On Peresani et al.'s (2013: 3) account, this shell was collected by Neanderthals at a fossil exposure more than 100 kilometres from the cave and transported to this site. Peresani et al. (2013: 11) reject hypotheses in terms of which the shell may have been a tool, a pigment container, or a manuport, i.e., 'a natural object unmodified or very marginally modified and moved from its original context by human agency and later curated, deposited, lost or discarded at an archaeological site'. They (2013: 11) instead hypothesise that Neanderthal occupants of the cave used the shell as a pendant, i.e., 'an object conceived to be suspended for visual display body [sic] through threading or stringing'. In support of this hypothesis, Peresani et al. (2013: 11) present three reasons: the attention given to uniformly covering the

outer shell surface with good pigment to make it suitable for body display, the wear detected on the inner lip of the shell, and the absence of pigment on the shell fracture.

To conclude: whatever limitations the six studies considered here may have, they are not open to the criticism that their results reflect the effects of stratigraphic mixing caused by post-depositional disturbances. This possibility is ruled out by the dating of the marine shells, raptor talons and wing elements concerned: at the time when these objects are believed to have been associated with Neanderthals, the sites could not have contained similar objects attributable to Aurignacians. The Neanderthal occupation of the sites dates back to a period prior to the appearance of Aurignacians in the regions of the sites. The results reported in the six studies discussed here, accordingly, boost the support for the view that the Neanderthals concerned were indeed associated with objects that might have been personal ornaments.[10] Tom Wynn (personal communication), moreover, points out that the six sites at issue have been excavated more recently than the Grotte du Renne. Consequently, the evidence yielded by these sites is of a higher quality than that derived from the Grotte du Renne.

Whether in fact the objects recovered at the Grotte du Renne and the six other sites concerned were treated as personal ornaments by their Neanderthal inhabitants is a different matter to which I will turn in Section 3.4. First we have to consider the second main doubt about the link between these Neanderthals and the putatively ornamental and bone items.

3.3.2 At Issue: The Nature of the Link

We turn next to the second main doubt about the soundness of the personal-ornament inference represented by ABC in Figure 1. Recall that, stated as (a)(ii) in Section 3.2: the material objects – e.g., marine shells, raptor talons etc. – that are supposed to have been worn by Neanderthals as ornaments were associated with them but not in the 'right' way. Two questions immediately arise in connection with this doubt: 'What would the "right" way be?' and 'What are the ways considered to be "wrong"?'

Though some scholars will agree that the ornamental artefacts and bone tools concerned were associated with Neanderthals, they will maintain that this association is not of the 'right' kind. That is, they will argue that these objects were not invented by Neanderthals 'continuing their own independent tradition of developing complexity', as Stringer (2011: 165) puts it. As for the 'wrong' ways in which these objects may have become associated with Neanderthals, various are suggested in the literature, including the following:

'Wrong' Associations between Ornamental Items and Neanderthals

The items were made by modern humans and were:
(a) acquired by Neanderthals through trade with modern humans;
(b) collected by Neanderthals at sites previously occupied by modern humans;
(c) imitated by Neanderthals after cultural contact with modern humans.

On a wider interpretation, possibilities (a)–(c) have collectively been known as the 'acculturation hypothesis'; on a narrower one, this expression has been used to refer to the third possibility alone.

Specifically the third possibility, also referred to as the 'imitation hypothesis', has been the topic of intense, and at times acrimonious, debate. Proposed first and rejected later by Leroi-Gourhan, this hypothesis has Mellars, Gravina, Taborin and White amongst its more recent supporters.[11] Championing the 'independent invention' view, d'Errico, Zilhâo and their associates have been the strongest critics of the acculturation hypothesis.[12] Technical arguments and counter-arguments have been flying to and fro between the supporters and critics of the acculturation hypothesis, without one side appearing to convince the other. This point is illustrated by, amongst other things, the exchanges in *Current Anthropology* (Volume 39, Supplement, June 1998) between, on the one hand, d'Errico et al. and, on the other hand, Mellars, Taborin and White. This debate was about issues such as the following: (i) the matter of the lack of a consensus meaning for the concept of 'acculturation' in cultural anthropology (d'Errico et al. 1998: S3); (ii) the difficulty of establishing adequate criteria for testing the acculturation hypothesis in the archaeological record (d'Errico et al. 1998: S3); (iii) doubts about whether there is convincing evidence that the personal ornaments and bone tools associated with Neanderthals can be interpreted as copies of Aurignacian originals (d'Errico et al. 1998: S11); (iv) the tenability of the view that the blade technology of the Châtelperronian and the standardisation of tool types were acquired by Neanderthals through contact with or under the influence of modern humans (d'Errico et al. 1998: S13); and (v) the issue of the absence of fundamental changes in the material culture of Iberian Neanderthals despite the fact that they lived side by side with modern humans for a period of roughly 5,000–10,000 years (d'Errico et al. 1998: S19).

A core issue in the debate was the strength of the evidence for (i) the hypothesis that Arcy Neanderthals acquired personal ornaments through trade (i.e., possibility (a) at the beginning of this section) and (ii) the hypothesis that they acquired these items through collection (d'Errico et al. 1998: S8). Relevant here also are some comments by Soressi and d'Errico (2007: 10) on the view that Neanderthals blindly copied the behaviour of modern humans without understanding the implications of it. According to them, in the unlikely event that Neanderthals acquired certain 'activities' by contact from modern humans, '... it was made possible because the Neanderthal societies

possessed an understanding of social systems and techniques which permitted this exchange'.

It is virtually impossible for non-experts to judge the force of many of the arguments and counter-arguments used by the critics and defenders of the acculturation hypothesis. Even Chris Stringer (2011: 164), a physical anthropologist noted for his work on human evolution, asserts in a guarded way that each of these possibilities listed as (a)–(c) above has support from one group of archaeologists or another, as has the possibility that the items in question were independently invented by Neanderthals. Strong support for this last possibility will evidently bear negatively on the other possibilities. It appears that the arguments made by those who are critical of the acculturation hypothesis have, on the whole, a firmer basis in archaeological fact than the arguments of those who champion this hypothesis. One point seems clear, though: the acculturation hypothesis has a core limitation. It cannot account for the origin of the allegedly ornamental items that date back to periods before the appearance of (Proto-)Aurignacians in the areas concerned. The six studies discussed in Section 3.3.1.3 present substantive evidence that the allegedly ornamental marine shells, raptor talons, raptor phalanges and raptor feathers were created by the Neanderthals under consideration and not by (Proto-) Aurignacians who appeared after them.[13]

3.4 The Step from Marine Shells, Raptor Talons etc., to Personal Ornaments

Let us proceed, then, from the assumption that Neanderthals were associated in the 'right' way with the marine shells, raptor talons etc. found along with some of their skeletal remains at the sites mentioned in Section 3.3. That is, we assume that the first inferential step – represented by B in Figure 3.1 – in the personal-ornament inference is sufficiently grounded. To make this assumption, however, is *not* to claim that these shells, talons etc. were worn as ornaments by the Neanderthals concerned. The latter claim, rather, represents a conclusion inferred from data about the former objects. And to be able make this inference one needs amongst other things (i) a theory of the distinctive properties of Palaeolithic/Neanderthal personal ornaments and (ii) evidence that the shells, talons etc. under consideration have these properties. Jointly (i) and (ii) would serve to warrant the inferential step represented by B in Figure 3.1. So, let us take a closer look at (i) and (ii).

3.4.1 The Theory of Neanderthal Personal Ornaments

Consider first the reason why it cannot be just assumed or simply asserted that the recovered marine shells, raptor talons, animal teeth and the like were

Neanderthal personal ornaments. At the core of the matter is a difference in thing-hood: Whereas such shells, talons, teeth etc. are 'raw', uninterpreted, material objects, personal ornaments are entities of a different kind. What are personal ornaments, then? The answer is not simple, as is clear from Oscar Moro Abadía and April Nowell's (2014) landmark account of the history and epistemology of the concept of 'ornament' in the field of Palaeolithic archaeology. They (2014: 967) define the term 'ornament' as denoting 'a thing used or serving to make something look more attractive but usually having no practical purpose, especially a small object such as a figurine'. Switching from 'ornament' to 'personal ornament', they caution that 'the description of perforated shell [sic], pierced teeth, and other items as "personal ornaments" is not a value-free description but a historically determined interpretation'. The term 'ornament', they explain, '. . . was introduced in archaeology during the second half of the nineteenth century, a moment in which the use of ethnographic parallels was widespread'. But, Moro Abadía and Nowell (2014: 968) observe, it is quite problematic to attribute a particular function to Palaeolithic objects on the basis merely of a number of modern ethnographic examples. That is, they state that 'archaeologists cannot assume that prehistoric groups used certain items in the same way which modern small-scale societies employ similar objects'. Currently, nonetheless, this assumption is still made by archaeologists who use ethnographic analogies to justify their attribution of certain functions, that of ornaments among them, to certain prehistoric objects, Vanhaeren (2005: 533) notes. This means that functions are still being assigned to prehistoric objects on the grounds that modern traditional societies use comparable objects in such functions, despite the fact that prehistoric and modern societies are known to differ in regard to the capacities and behaviours of their members.

Moro Abadía and Nowell (2014: 967), moreover, judge the implicit assumption that the *main* function of marine shells, beads and pendants was that of adorning or beautifying the human body to be '. . . somewhat reductionist in the light of the many social, symbolic, cognitive and artistic values currently attributed to these items'. This judgement is illustrated by Moro Abadía and Nowell's (2014: 955–56) survey of some of the other roles that have been attributed by archaeologists to marine shells, beads and other similar objects in prehistorical contexts. It has been claimed, for instance, that these objects served (i) as money or barter objects to facilitate commerce among prehistoric groups; (ii) as items with religious or magical uses; (iii) as items reflecting not only the affiliation of individuals to clans and secret societies but also their rank within the social group; (iv) as 'curiosities'; (v) as food processing tools; and (vi) as items associated with superstition and legends. In addition, Moro Abadía and Nowell (2014: 966) note that on more recent accounts, shells and ornaments have been considered important archaeological proxies for

exploring cognitive human faculties other than symbolisation, including memory, musicality, perception, numeracy and concepts of time.[14] The gist of Moro Abadía and Nowell's account is that 'Palaeolithic ornament' is not an observational term for describing 'a very heterogeneous set of artifacts'. It is instead a theoretical concept – one, moreover, considered by them (2014: 967) to be 'highly connoted'. Because this concept is so highly connoted, they seem to suggest that it should be replaced but that 'it may be too late to look for alternatives'.

Viewed from this perspective, Palaeolithic ornaments do not instantiate just a single kind of entities. They represent, instead, as many different kinds of entities as there are theories to which a concept of 'Palaeolithic ornament' is central. As seen above, these theories are about different putative realms or (sub-)realms of the Palaeolithic world, including commerce, religion, superstition, magic, social affiliation and rank, tools, memory, musicality, numeracy, time and – to mention a last one – personal decoration or beautification. This, of course, is not to say that these theories are all equally good. The main point is clear, though: whatever Neanderthal ornaments may be, they are not 'raw', uninterpreted, material entities such as marine shells, raptor talons etc. as these occurred in nature. Their ontological status – their thing-hood – is rather determined by theories of specific domains of the Palaeolithic world. If the rough distinction 'material vs cultural' were to be adopted, many of these domains could be dubbed 'cultural'.

The next question, then, is 'What kind of objects are the personal ornaments that are claimed to have been associated with specifically the Neanderthals under discussion?' On a widely held theory, the following features, amongst others, have been attributed to Neanderthal personal ornaments:

Theory of Neanderthal Personal Ornaments
Personal ornaments are objects that Neanderthals:
(a) intentionally collected, selected and transported;
(b) modified, i.e., pierced, grooved, abraded, thinned, smoothed, polished, shaped, strung etc.;
(c) wore on their body for a prolonged period.

Though not stated in this explicit format, this theory is fundamental to the view of Neanderthal personal ornaments held by archaeologists such as Blackwell, d'Errico, Vanhaeren, Zilhão and their research associates.[15] Some authors would extend this theory by maintaining that such ornaments have defining functional features in addition to the features (a)–(c). For instance, that Neanderthals used them (i) as body adornments, (ii) as markers of ethnic, social or personal identity; (iii) as items in performing rituals; or (iv) as symbols.[16] This theory of Neanderthal ornaments instantiates a more general theory of the distinctive features of prehistoric ornaments, the core of which is captured by

d'Errico and Vanhaeren's (2009: 25) statement that '[to] determine whether purported ancient beads were used as such [i.e., as personal ornaments – R.B.] requires evidence for human involvement in their selection, transport, manufacture, and use'. This general theory of prehistorical personal ornaments is also invoked by d'Errico et al. (2005) to warrant their inference that the prehistoric marine shells recovered at Blombos Cave were treated as ornamental beads by the cave's Middle Stone Age (MSA) inhabitants.[17] Specifically, they make the following assumptions, amongst others: MSA shells are probably beads if (i) the shells were collected, transported and accumulated by humans; (ii) the shells have perforations that were made by humans; (iii) the shells have properties caused by use-wear (e.g., by rubbing on something); and (iv) the shells exhibit traces of ochre resulting from tool use by humans. According to Henshilwood and Dubreuil (2011: 374), use-wear patterns are the 'principal factor' in deciding whether artefacts had the status of prehistoric personal ornaments.

3.4.2 The Ornament-Hood of Marine Shells, Raptor Talons etc.

This brings us to the evidence for concluding that the marine shells, raptor talons and the like associated with Neanderthals were used by them as personal ornaments. Assuming the theory of Neanderthal ornaments outlined in the preceding section, there needs to be evidence indicating that a given marine shell or talon was (i) intentionally collected and selected; (ii) modified in specific ways; and (iii) worn for a prolonged time by the Neanderthals concerned. What the evidence for (ii) and (iii) should be about is clear from d'Errico and Blackwell's (2016) account of the earliest evidence for personal ornaments associated with burial.

So, let us turn to pertinent specifics of this account. At issue in it, is among other things, whether two perforated prehistoric *Conus ebraeus* shells – referred to as '*Conus* 1' and '*Conus* 2' – were ornaments (See Image 3.5). These marine shells were recovered in close proximity to the skeleton of an infant of four to six months of age in a pit in Howiesons Poort layers, dated roughly 74 ± 4 BP, of Border Cave. This cave is described as a rock shelter in the western escarp of the Lebombo Mountains in KwaZulu-Natal, near the border between South Africa and Mozambique. In their account, d'Errico and Blackwell (2016: 91) '... demonstrate that the perforations at the apex [of the shells – R.B.] were produced by humans, and that traces of wear due to prolonged utilization as an ornament are present'.

As for the particulars of this demonstration, having subjected the two *Conus* shells to a meticulous microscopic examination, d'Errico and Blackwell (2016) make findings such as the following about the physical features of these shells:

Image 3.5 A *Conus* shell, referred to as '*Conus* 2', probably originating from Border Cave layer 1 RGBS
(d'Errico and Blackwell 2016: 95)

Findings about Features of Conus 1 and Conus 2

(a) 'The presence of a perforation on the apex of the Border Cave *C. ebraeus* specimens does not conform to the natural process of shell degradation'. (p. 105)
(b) 'both perforations were human made and . . . this happened by using a technique that was able to create a hole in the thick apex of this species'. (p.105)
(c) 'The lack of use-wear suggests that this shell [i.e., *Conus* 1 – R.B.] was not used as a pendant for a protracted length of time'. (p. 105)
(d) '*Conus* 2's heavily smoothed surface is covered with a wear pattern that is better explained as a result of prolonged utilization of the shell as a pendant, rather than from natural or intentional polishing'. (p. 105)
(e) 'If *Conus* 2 was intentionally polished, this would have resulted in remnants of oriented striae, which are not observed'. (p. 105)
(f) 'Use-wear around the perforation and on the shell surface [of *Conus* 2 – R.B.] suggests that some type of string was threaded through the perforation, and that the shell was relatively free to move when worn'. (pp. 105–06)
(g) 'Differential fading of the color pattern suggests that the ventral aspect of this shell [i.e., *Conus* 2 – R.B.] was more often in contact with the agent (skin, clothing etc.) responsible for the wear pattern'. (p. 106)
(h) 'The indentations at the top and bottom of the outer lip [of the perforation on the apex of *Conus* 2 – R.B.], and use-wear along the inner lip, indicate

that the same, or another, string may have been in contact with those areas'. (p. 106)

(i) 'The red residue adhering to *Conus* 1 cannot be interpreted as cave sediment given the dark color of the layer in which the infant skeleton was found'. (p. 106)

(j) 'The same applies to *Conus* 2, on which microscopic red residues are overlain by a dark brown matrix'. (p. 106)

(k) 'Elemental analysis of residues on *Conus* 1 is consistent with the interpretation of the red spots as remnants of red pigment originally coating the shell surface'. (p. 106)

Being the results of a remarkably careful and systematic examination of relevant physical features of the two *Conus* shells, these findings represent strong evidence for the inference that these shells were personal ornaments of inhabitants of Border Cave. This gives rise to the question 'How strong is the evidence for the inferences that assign ornament status to the animal teeth, ivory 'beads', ivory 'rings', raptor talons, wing bone elements, eagle phalanges, and marine shells associated with the Neanderthal inhabitants of the caves considered in Section 3.3?' Not all accounts of the physical features of these objects are as exhaustive as d'Errico and Blackwell's account of the comparable features of *Conus* 1 and *Conus* 2, but many recent observations about relevant physical features of Neanderthal-associated objects are strikingly detailed and precise, a point illustrated by the following instances:

Observations Indicating Ornament-hood of Neanderthal-Associated Objects

(a) *A groove in Grotte du Renne ivory rings:* 'The two incomplete ivory rings from level X . . . come from adjacent squares (Y11 and X12) and present manufacturing traces in the form of striations on one of the faces, showing that an engraving tool was used to make a deep circular groove'. (d'Errico et al. 1998: S8)

(b) *Perforations and grooves in Grotte du Renne animal teeth:* 'Châtelperronians made perforations in the roots of the fox canines and grooves on the other teeth'. (d'Errico et al. 1998: S12)

(c) *Perforations in Grotte du Renne (and Quinçay) animal teeth:* Six teeth recovered in the Châtelperronian levels of the Quinçay rockshelter in western France were all '. . . perforated by the same technique documented at the Grotte du Renne, i.e., by first abrading the root, then piercing the thinned surface with a puncture blow or a series of pressure removals, and finally smoothing and enlarging the hole'. (Zilhão 2007: 26)

(d) *A pigment-stained marine shell from Cueva de los Aviones:* 'Two complete specimens from level II are umbo-perforated [where 'umbo' refers to a knob above the hinge of a bivalve shell – R.B.] . . . and residues of a red

colorant, identified as hematite . . . were found while cleaning the carbonate coating around the perforation of the larger shell . . . the parsimonious interpretation of *Glycymeris* shells, even in the absence of pigment residues and irrespective of the origin of the perforation, is that they are personal ornaments'. (Zilhão et al. 2010: 1024)

(e) *Assorted features of talons from the Krapina Neanderthal site:* 'Four talons bear multiple, edge-smoothed cut marks; eight show polishing facets and/or abrasion. Three of the largest talons have small notches at roughly the same place along the plantar surface, interrupting the proximal margin of the talon blade. These features suggest they were part of a jewelry assemblage, – the manipulations a consequence of mounting the talons in a necklace or bracelet'. (Radovčić et al. 2015: 1)

(f) *Assorted marks on Grotta di Fumane wing bones:* 'Cut, peeling, and scrape marks, as well as diagnostic fractures and a breakthrough are observed exclusively on wings [of various species of birds – R.B.], indicating the intentional removal of large feathers by Neanderthals'. (Peresani et al. 2011: 3888) For example: 'On the lateral portion of the ventral face, at the top of the condylus dorsalis ulnae [of a lammergeyer – R.B.] there are three short and deep transversal marks . . . All of the traces are latero/medially oriented, reflecting the cut of the extensor carpi and flexor carpi ulnaris muscles for the ulna-carpometacarpus disarticulation.' (Peresani et al. 2011: 3889)

(g) *Cut marks on golden eagle pedal phalanges from Rio Secco Cave and Mandrin Cave:* 'The bones show cut-marks located on the proximal end ascribable to the cutting of the tendons and the incision of the cortical organic tissues'. (Romandini et al. 2014: 1)

> 'The anthropic traces are short and are localised along the perimeter of the proximal articular facet [of the pedal phalanx – R.B.]. . . In three cases . . . the cutmarks suggest the cutting of the medial and lateral extensor tendons and ligaments [in order to remove the claw – R.B.]'. (Romandini et al. 2014: 6)

(h) *Cut marks on wing and foot bones from Combe Grenal and Les Fieux:* 'The cut marks that we have identified [on wing and foot bones of diurnal raptors – R.B.] are often deep and tend to show sharp boundaries typical of incision marks produced with a stone tool'. (Morin and Laroulandie 2012: 1)

(i) *Assorted features of the ochered marine shell from Fumane Cave:* 'The wear detected on the inner lip [of the shell – R.B.], made of overlapping groups of striations oriented perpendicular to the shell main axis, is consistent with a sustained friction produced by a cord rich in abrasive particles, such as a sinew'. (Peresani et al. 2013: 8)

Observations such as these – many of which are about the origin and properties of perforations in shells and cut marks on bones – are clearly

relevant within the framework of the theory of Neanderthal personal ornaments. In addition, the precision of many of these observations results from careful microscopic examinations of the shells, bones etc. concerned. Within the framework of this theory of Neanderthal personal ornaments, these observations seem to provide ample empirical grounding for the inferential step – B in Figure 3.1 – yielding the conclusion that the objects concerned were indeed personal ornaments of the Neanderthals with whom they were associated.[18] This conclusion does not imply, though, that these ornaments were treated as symbols by the Neanderthals who made and wore them, a point taken up in the next section.

3.5 The Step from Personal Ornaments to Symbols

3.5.1 Run-up

Assuming, then, that some Neanderthals had personal ornaments, a first question is whether they treated their personal ornaments as symbols. A considerable number of scholars has claimed that this was indeed the case. Thus, recently symbolic status has been assigned by:

- Zilhão et al. (2010: 1023) to the perforated cockle and scallop shells recovered at Cueva de los Aviones;[19]
- Radovčić et al. (2015; 1, 11) to the raptor talons found at Krapina;
- Morin and Laroulandi (2012: 1) to the eagle phalanges recovered at Combe-Grenal and Les Fieux;
- Romandini et al. (2014: 3, 8, 9) to the raptor claws found in Rio Secco Cave and Mandrin Cave;
- Peresani et al. (2011: 3892–93) to raptor feathers intentionally removed from wing bones found in Grotta di Fumane;
- Peresani et al. (2013: 1, 8) to the ochered marine shell found at Fumane Cave.

Finds such as the Cueva de los Aviones cockle and scallop shells – believed to have been worn as pendants – induced Stringer (2011: 166) to state that '... Neanderthals were participating in symbolism just as the moderns were', thereby abandoning his earlier agnostic view of Neanderthals' symbolic behaviour.

There is a second, more fundamental, question though. It is about the adequacy of the conceptual framework within which symbolic status has been assigned to Neanderthal personal ornaments. How vital it is that this framework should be adequate is illustrated by the debate about whether the personal ornaments attributed to the MSA inhabitants of Blombos Cave were used by them as symbols. So, what can we learn from this debate that

bears on the tenability of claims assigning symbol-hood to Neanderthal personal ornaments?

3.5.2 Lessons from the Blombos Debate

3.5.2.1 About Telling Exchanges At the centre of the debate is a target article in *Current Anthropology* (Volume 52, 2011) by Christopher Henshilwood and Benoît Dubreuil in which they repeat a claim made earlier by Henshilwood et al. (2004) and d'Errico et al. (2005), namely that the shell beads recovered at Blombos Cave were treated by the prehistoric inhabitants of the cave as symbols. This article is followed by invited commentary by nine scholars, followed in turn by a reply by Henshilwood and Dubreuil. As for the target article, Henshilwood and Dubreuil argue in it that:

> several innovations in the southern African archaeological record [specifically, the part pertaining to the Still Bay and Howiesons Poort techno-traditions – R.B.] are characterized, at a minimum, by an interest in the appearance of objects, that is, in the way objects look from different perspectives. In addition, we argue that several artifacts likely provide evidence of symbolically mediated culture that depends on higher theory of mind. Our definition is that a symbolically mediated culture is one in which individuals understand that artifacts are imbued with meaning and that these meanings are construed and depend on collectively shared beliefs. (Henshilwood and Dubreuil 2011: 368)[20]

The artefacts referred to by Henshilwood and Dubreuil (2011: 174) include a number of *Nassarius kraussianus* marine or 'tick' shells that were recovered at Blombos Cave (See Image 3.6). An analysis of forty-one of these shells reveals them to have been carefully pierced with a bone tool to create a keyhole perforation. The shells are claimed to have been strung on a cord or sinew and worn as beads by a number of individuals, '... perhaps on their person or attached to clothing or other artifacts' (Henshilwood and Dubreuil 2011: 374). In short, these marine shells are believed to have been personal ornaments.

Henshilwood and Dubreuil's (2011: 375) inference that the Blombos beads were symbols gives rise to questions such as 'Why do they and fellow archaeologists believe that these beads were treated as symbols?', 'What are the distinctive properties of symbols according to them?', and 'To what theory of symbolism do they subscribe?' These questions are not addressed in an explicit and systematic way in the target article itself. Henshilwood and Dubreuil do give the definition of symbolically mediated culture quoted above; they refrain, however, from spelling out their theory of symbolism in this article. Nor do they refer to any published version of the theory of symbolism that is presupposed by scattered remarks made in earlier articles co-authored by Henshilwood.[21] In the target article, Henshilwood and Dubreuil give at most an indication of their reasons for drawing the inference that the Blombos

Image 3.6 Middle Stone Age *Nassarius kraussianus* shell beads from Blombos Cave, South Africa
(image courtesy Christopher Henshilwood)

shell beads were symbols. According to them, that is, '[t]wo things can be said regarding the inference that the beads are symbols':

> The first is that the use of personal ornaments was not idiosyncratic, since beads come from different levels and squares. This distribution is difficult to explain unless we accept that beads functioned as symbols, that is, that their function depended on collectively agreed-upon meaning (and not on the idiosyncratic interest of individuals in their appearance). If one contests the symbolic interpretation of beads, one has to find a more parsimonious way to account for the fact that different people at different times used similar personal ornaments.
>
> The second point is that there are good reasons to believe that the same cognitive abilities are required to imbue objects with symbolic meaning and to develop a concern for one's personal appearance. Indeed, both depend on the capacity to inhibit one's own perspective and pay attention to potentially conflicting views on objects . . . Thus, in our view the inference that beads can act as symbols is parsimonious. (Henshilwood and Dubreuil 2011: 375)

Various scholars participating in the Blombos debate in *Current Anthropology* express serious doubts about Henshilwood and Dubreuil's inference that the Blombos shell beads were symbols. A first such doubt concerns the way in which Henshilwood and Dubreuil reason in assigning symbolic meaning to Blombos beads and engraved ochres. Thus, Lambros Malafouris (2011: 385) asks 'why, for example, does a series of deliberately incised lines suggest or embody symbolic meaning? When and how are the markings symbolic? No satisfactory answer is given [by Henshilwood and Dubreuil – R.B.] to these basic questions'. According to Malafouris, Henshilwood and Dubreuil's contention that the presence of a symbolic component is the most central innovative feature of material culture during these periods [i.e., the Still Bay (SB) and Howiesons Poort (HP)– R.B.] should have been the end rather than the starting point of their analysis. In the view of Malafouris –

> [r]ather than being taken for granted, how and why a 'deliberately engraved' ochre or a 'shell bead' comes to stand for something else in an explicit, conscious way – that is, as an arbitrary sign – is precisely what must be established and accounted for. (Malafouris 2011: 385)

In their response to Malafouris's criticism, Henshilwood and Dubreuil attempt to 'clarify the debate', by asserting that:

> [i]f by symbolization we mean the relationship between the cross and crucifixion – the fact that the cross stands for crucifixtion – then it is perfectly possible that SB and HP engravings and personal ornaments were not symbolic. It is perfectly possible that they acted in the same way as piercings, simply indicating coolness [the meaning assigned by Henshilwood and Dubreuil to the personal ornaments at issue – R.B.] or good taste'. (Henshilwood and Dubreuil 201:391)

Henshilwood and Dubreuil, however, go on to contend that these personal ornaments were symbolic in virtue of the conventional nature of the link existing between them and the concept of 'coolness'. That is, Henshilwood and Dubreuil (2011: 391) '. . . call this conventional link between an abstract property (coolness) and an artefact (personal ornaments) "symbolic"'.

Henshilwood and Dubreuildo not show, however, how this notion of 'symbolism' ties in with the justification given by them in the target article (p. 385) for their inference that the beads are symbols. As quoted above, this justification comprises two 'things', i.e., reasons. Recall that the first is that the use of personal ornaments was not idiosyncratic, since the beads come from different levels and squares, and that the second is that there are good reasons to believe that the same cognitive abilities required to imbue objects with symbolic meaning are required to develop a concern for one's personal appearance. Moreover, Henshilwood and Dubreuil not provide any evidence for their claim that the concept of 'coolness' is the meaning of the Blombos beads. That is, they do not justify their attribution of specifically the meaning of 'coolness' to the SB and HP artefacts. Nor do they address the more general question of what may count as evidence for attributing a particular meaning to a prehistoric artefact.

A second doubt expressed in the Blombos debate in *Current Anthropology* concerns the kind of meaning assigned by Henshilwood and Dubreuil to the shell beads under consideration. In this regard, Coolidge and Wynn (2011: 381) question the function that Henshilwood and Dubreuil assign to symbols in the context of their definition of symbolically mediated culture. Henshilwood and Dubreuil contend that the function of symbols is dependent on their collectively agreed-upon meaning. But according to Coolidge and Wynn, this contention is problematic in at least two ways: first, it excludes symbols from having any private meaning for a particular artist, and second, it excludes symbols from representing the unknowable, as claimed by Carl

Jung. Coolidge and Wynn suggest that personal meanings were undoubtedly a precursor to collectively shared meanings. To illustrate the point, they (2011: 381) observe that doodling or cave doodles, which might have held very personal meanings for their makers, would not be symbolic according to Henshilwood and Dubreuil because they do not have collectively shared meanings. Coolidge and Wynn, accordingly, stick to their view that private meanings for personal ornaments and stylistic engravings '... might better explain their appearance, disappearance, and reappearance in the SB and HP archaeological periods'. In responding to commentary on their target article, Henshilwood and Dubreuil do not offer a direct reply to these views of Coolidge and Wynn's.

A third doubt concerns the parsimony claimed by Henshilwood and Dubreuil for their inference that the Blombos shell beads were symbols [see the quotation above]. They challenge dissenting scholars to come up with 'a more parsimonious way to account for the fact that different people at different times used similar personal ornaments'. This challenge is taken up by Coolidge and Wynn (2011: 381). Invoking the tripartite Peircian distinction between symbols, indexes and icons, they argue that the most parsimonious explanation of the wearing of the shell beads by Blombos people is that 'the beads were indexes, not symbols'.[22] Here is their argument:

> Does shared agreement about appearance require that people imbue objects with symbolic meaning? We think not. Many of our students [who are modern humans – R.B.] sport body piercings, tattoos, and jewelry. None admits to understanding any meaning to these items. They wear them because their friends and acquaintances wear them. Yes, they are indexes of membership in some vague group, but they have no explicit or even implicit meaning beyond a simple association of appearance and social role ... Yes, perhaps the Blombos people believed that wearing beads meant high status or motherhood, but they need not have done so. This distinction between index and imbued meaning is not, we think, trivial'. (Coolidge and Wynn 2011: 381)

Coolidge and Wynn point out that their indexical account is more parsimonious in that it requires self-awareness and awareness of others' perspective but does not also require 'inhibit[ing] one's own perspective' or paying 'attention to potentially conflicting views on objects' – two requirements imposed by Henshilwood and Dubreuil's symbolic account.[23] Coolidge and Wynn, moreover, are of the view that indexical use of objects such as beads may have provided the scaffold on which arbitrary [symbolic – R.B.] meaning developed, a view with which Alan Barnard (2012: 78) agrees.

In their reply, Henshilwood and Dubreuil do not consider the proposal made by Coolidge and Wynn in response to their 'parsimony' challenge. Henshilwood and Dubreuil (2011: 390) instead take up the question of whether piercings and tattoos are indices or symbols, arguing as follows:

> It all depends on what we mean. On the one hand, we can argue that piercings do not symbolize coolness; they indicate it. They are thus better understood as indices rather than as symbols. On the other hand, they do not indicate coolness by way of physical association – the distinctive feature of Peircean indices – because 'coolness' is not a physical property that one can point to ostensively. Coolness refers to the way a behaviour or object is appraised within a certain group. It takes the form of abstract and socially shared standards that we use to find our way in the game of reputation. Thus, piercings may not symbolize coolness in the same way that, for instance, the cross symbolizes the crucifixion, but they certainly rest on an arbitrary (and conventional) connection between a physical object and a shared representation of coolness. This feature seems sufficient for piercings to qualify … as symbolic (at least in Peirce's sense). (Henshilwood and Dubreuil 2011: 390–91)

Crucial to Henshilwood and Dubreuil's argument is the view that, for piercings and tattoos to be indexes, there needs to be a physical association between these signs and the concept of 'coolness'. And this cannot be the case since 'coolness' is an abstract concept. But if piercings and tattoos do not have an abstract concept such as 'coolness' as their meaning – and have no explicit or even implicit meaning beyond a simple association of appearance and social role, as suggested by Coolidge and Wynn – this argument is less than powerful.

Matt Rossano (2011: 387), another participant in the Blombos debate in *Current Anthropology*, also argues – as he did earlier (Rossano 2010: S92) – that the Blombos beads were not used by inhabitants of the cave as symbols but rather as a particular kind of indexes. Thus, assuming that there are different levels of referential thinking that make varying cognitive demands, Rossano (2011: 387) asserts that '[b]eads and other self-reflective artifacts may be understood as symbolic in the sense that they stand for something else (e.g., the clan to which one belongs), but they may be best understood as what Peirce calls "indexes"'. If a certain clan always wears a certain bead, Rossano observes, then those beads 'stand for' the clan indexically. Such beads, more specifically, are portrayed by him as artificially or culturally constructed indexes. They differ from naturally occurring indexes such as smoke that indicates fire and tears that indicate sadness. According to Rossano (2011: 387), beads are an artificially constructed index in the sense that '[a]t their inception, an arbitrary connection was made: somebody decided that this bead would serve as an indicator of that clan. From that point, spatial and temporal reinforcement could keep the connection going and minimize the cognitive load'.

Expanding on these views, Rossano suggests that this arbitrariness, supported by constant spatial/temporal reinforcement, may have served as an important bridging step in moving from simple, naturally occurring indexes (smoke-fire) to entirely culturally constructed, naturally unsupported symbol systems. And he points out the danger of thinking in dichotomous terms about symbolism: it is too simplistic to think about symbolism as 'you either have it

or do not'. He believes that the SB/HP does not evidence yet the complex symbol systems of modern human cognition. Instead, according to him (2011: 388), it represents '... an important move in that direction: arbitrarily constructed indexes that help span the cognitive gap from minimally symbolically capable cognition to fully symbolically immersed cognition'.

Replying to Rossano, Henshilwood and Dubreuil (2011: 389) 'wholeheartedly agree' with his view that it is simplistic to think of symbolism as 'either you have it or you don't'. They assert that the challenge is to find ways of characterising types of symbol use that make sense at the cognitive level. But in response to the question of whether Peirce's distinction between symbols and indexes can help clarify the issues they address, they criticise not only his conception of indexes but also Deacon's (1997) interpretation of it. As noted above they (2011: 390–91) nevertheless go on to invoke Peirce's notion of an index to argue contra Coolidge and Wynn that piercings and tattoos are not indexes indicating coolness.

3.5.2.2 About (In)Adequate Conceptual Frameworks The exchanges in the Blombos debate in *Current Anthropology* considered here are not only instructive of twists and turns in the debate about whether the Blombos beads were symbols. These exchanges are also suggestive of a conceptual framework that may be fruitfully used for pursuing the question of whether the personal ornaments of prehistoric populations were treated by them as symbols. These populations include the groups of Neanderthals to which such ornaments have been attributed. So, what does this conceptual framework – henceforth for short, 'The Basic Framework' – consist of? Minimally, the following:

Components of The Basic Framework

(a) A general theory of symbolism that draws a principled distinction between, amongst other things:
  (i) symbols, indexes and icons,
  (ii) natural and artificially/culturally constructed indexes,
  (iii) referential meanings and indications of status, whether social or otherwise,
  (iv) private meanings and socially shared meanings.[24]

(b) A clear conception of the *kinds* of data that may constitute evidence for or against claims attributing to prehistoric personal ornaments the semiotic statuses provided for in (a)(i) and (ii), and the semantic properties involved in the distinctions drawn in (a)(iii) and (iv).

(c) Warrants for inferring from data about specific Neanderthal personal ornaments that they exhibited/lacked a particular semiotic status or semantic property.

The general theory of symbolism mentioned in (a) is fundamental to the conceptual framework within which Neanderthal symbolism should be investigated. This theory, that is, suggests a range of pertinent questions about Neanderthal symbolism: questions about whether particular prehistoric personal ornaments have the semiotic status and properties provided for by it. In so doing, this theory also suggests what would count as insightful claims about Neanderthal symbolism: claims providing answers to the suggested questions. In so doing, this theory – in conjunction with the warrants mentioned in (c) – indicates, moreover, what kinds of data would constitute evidence for or against such claims: data about the specified semiotic statuses and properties of personal ornaments.[25]

The latter point can be illustrated with the aid of Henshilwood and d'Errico's (2011) discussion of the kinds of data that have been adduced as evidence for the symbolic interpretation of Middle Stone Age engravings recovered at the sites of Blombos Cave and Diepkloof Rock Shelter.[26] At Blombos Cave, at least fourteen 'pieces of ochre engraved with deliberate abstract patterns' were found in levels dated at circa 75,000 and 100,000 years ago (Henshilwood and d'Errico 2011: 78, 83–88). At Diepkloof Rock Shelter, 270 engraved ostrich shell fragments were found in HP levels dated at circa 60,000 years ago (Henshilwood and d'Errico 2011: 78, 80–82).

In discussing the alleged symbolic nature of the Blombos and Diepkloof engravings, Henshilwood and d'Errico (2011: 89) list sixteen 'explanations [also called 'arguments' by them – R.B.] to support the symbolic interpretation of early engravings'. As described by them, these are:

'Explanations' or 'Arguments' for the Symbolic Interpretation of Early Engravings

(a) An absence of obvious functional reasons behind the production of the engravings;
(b) Consistencies in the media on which the engravings are made;
(c) The preparation of the surface prior to engraving;
(d) The degree of neuromotor control inferred from the analysis of each line;
(e) The type of tool used;
(f) The use of the same tool for the production of the entire pattern;
(g) The consistent organisation of the sequence of motions articulating the marking action;
(h) The regularity of the resultant pattern;
(i) The presence of engravings on a number of objects rather than a single one;
(j) The repetition of the same motif on more than one object;
(k) Variations within what is perceived as the same basic motif;
(l) The production of a variety of different motifs;
(m) Temporal continuity in the production of engravings on the same media;

(n) Persistence or change in the production of motifs through time;
(o) Production of similar engravings on the same media at a number of sites;
(p) Similarity in the media used for engravings by prehistoric, extant and/or historically known groups.

The question, of course, is 'Of what value are these "explanations" or "arguments"?' To which Henshilwood and d'Errico's reply is:

> Although none of these arguments proves that the engravings or the objects carried a specific meaning for past artisans and their associated band or group that may differ to our current interpretation, we can draw on these arguments to help rule out alternative hypotheses, highlight possible inconsistencies in our interpretations, and help in making balanced analyses. (Henshilwood and d'Errico 2011: 89)

This appraisal by Henshilwood and d'Errico is in a number of ways hard to understand. To begin with, to call (a)–(p) 'explanations of' or 'arguments for' 'the symbolic interpretation of early engravings' is to refer in an indirect way to kinds of data from which inferences have been drawn about the symbolic status of such engravings. The first question is 'Why should these kinds of data be taken to provide relevant evidence for such inferences?' The answer that may be expected is 'Because, there is a well-articulated general theory of symbolism within the framework of which these kinds of data constitute evidence for distinctive properties of symbols'. So, a second question is 'What are these distinctive properties in terms of the theory of symbolism subscribed to by Henshilwood and d'Errico?' In this regard, they say the following:

> A 'broad' definition for a symbol is something that represents something else by association, resemblance, or convention. A more 'strict' definition, that we adopt here, denotes a sign that has no natural connection or resemblance to its referent (Peirce 1998). (Henshilwood and d'Errico 2011: 89)

In terms of this statement of the Peircian definition, the distinctive property of symbols resides in the arbitrary nature of the link to their referent. This implies that the kinds of data from which it is possible to infer that the engravings at issue are symbols need to have a clear bearing on the nature of the link between these artefacts and their referents. But it is not evident that the kinds of data involved in (a)–(p) have an obvious bearing on the nature of the link between the engravings and their supposed referents. For instance, why should the type of tool used for making engravings or the consistency in the media used for such engravings indicate that they had a symbolic meaning for prehistoric humans? Within the framework of the Peircian theory of the distinctive properties of symbols subscribed to by Henshilwood and d'Errico, the kinds of data alluded to in (a)–(p) cannot constitute evidence for attributing symbol-hood to the engravings concerned. To be able to bring these kinds of data to bear on claims attributing or denying a symbolic status to artefacts, one

has to adopt a theory of symbolism in terms of which the distinctive features of symbols differ fundamentally from those provided for by a Peircian theory. An instance of such a non-Peircian theory would be one in terms of which the distinctive feature of symbols is that of 'having been deliberately manufactured'. But this feature has been taken to be distinctive of personal ornaments rather than symbols. Suppose, now, that data of several of the kinds specified in (a)–(p) were to converge, indicating that engravings or beads were deliberately made. This would still not make these kinds of data evidence that bears on the claim that these artefacts are Peircian symbols.[27]

General theories of symbolism, then, determine what kinds of data about early artefacts such as engravings and beads can or cannot serve as evidence for assigning or denying symbolic status to such artefacts. This point is in fact more general: it applies *mutatis mutandis* to the assignment of indexical status to indexes. General theories of indexes specify the distinctive properties of various types of indexes and, thereby, determine the kinds of data that may serve as evidence for assigning indexical status to artefacts. While agreeing with Coolidge and Wynn as well as with Rossano that the Blombos beads are indexes rather than symbols, Duilio Garofoli (2015) expresses the opinion that:

> non-symbolic explanations of early body ornaments are still underdeveloped. The debate requires augmentation with a more coherent framework for specifying how the non-symbolic categories of aesthetic and indexical artefacts are imbued with meaning and cognitively processed. (Garofoli 2015: 806)

Garofoli, accordingly, proposes in considerable detail a more 'coherent' framework. Central to this framework is a distinction between three categories of body ornaments, dubbed by him 'aesthetic', 'indexical' and 'fully symbolic'. As defined by him, (i) an aesthetic ornament is 'an artefact that acquires relevance in a social group because it elicits positive emotional reactions among its users' (Garofoli 2015: 815); (ii) (Peircian) indexes are signs '... interpreted by virtue of some brute, existential fact that causally connects them with their objects' (Garofoli 2015: 815); and (iii) (Peircian) full-symbols '... imply that the relationship between objects and signs is arbitrary and conventional', and moreover, acquire this status, according to Deacon (1997), only within some system of symbols (Garofoli 2015: 818). In terms of this tripartite distinction, Garofoli (2015: 821) contends, the Blombos beads may be regarded as aesthetic or indexical ornaments. He is of course not the first to express the view that the Blombos personal beads and engravings had aesthetic value for the humans who lived in the cave. This view was entertained before Garofoli by Wynn and Coolidge (2007: 88) and Malafouris (2008: 406).

As outlined above, The Basic Framework for work on symbolism is a minimal one and it is not presented here as the best possible one. If required, it may, that is, be extended in various ways. The rationale for extending this

framework is to make it more restrictive, which would lead to claims about prehistoric symbolism becoming more specific and so more controvertible. Below I list three distinctions that may be considered for incorporation into the general theory of symbolism included under (a) in The Basic Framework, resulting in:

The Extended Framework

(a) The distinction between aesthetic and indexical signs;
(b) The distinction drawn by Paul Pettitt (2011b: 148) among five uses of shell beads – decoration, enhancement, accessorisation, full symbolism, time/space-factored symbolism – and other body ornaments;[28]
(c) The distinction between the semiotic functions of personal ornaments and the various non-semiotic roles attributed by archaeologists to them in prehistorical contexts. As included in Moro Abadía and Nowell's (2014: 955–56) survey, these roles include those of (i) money or barter objects to facilitate commerce among prehistoric groups, (ii) 'curiosities', (iii) food processing tools, (iv) items associated with superstition and legends and so on.[29]

(a)–(c) are not intended to be a full list of the ways in which The Basic Framework may be extended. Thus, John Robb's (1998: 341) list of basic points to be taken into account in the study of symbols includes some finer semantic distinctions that may be incorporated into this framework. Furthermore, the Peircian sub-distinction between qualisigns, sinsigns and legisigns, adopted by Kissel and Fuentes (2018), may also be considered for inclusion in The Extended Framework. To qualify for inclusion in this framework, a distinction should be useful in making claims about prehistoric symbolism more restrictive. That is, claims that are more specific in regard to content and more controvertible.

3.5.3 The Symbol-Hood of Neanderthal Personal Ornaments

We are now conceptually equipped to return to the question of whether certain Neanderthals treated their personal ornaments as symbols, as has been claimed by Zilhão et al. and the other authors quoted in Section 3.5.1 above. To be able to answer this question, it is necessary to get clarity about the nature of the quoted claims. Recall that we have seen in Section 3.3.1.3 that these scholars claim that Neanderthals had personal ornaments. They infer this claim from precise data yielded by a close inspection of relevant physical features of specific objects associated with particular Neanderthals – e.g., those listed as (a)–(i) in Section 3.4.2. This inference, moreover, they draw within the conceptual framework provided by the theory of Neanderthal ornament-hood set out in Section 3.4.2. It may accordingly be expected that Zilhão et al. and

the other authors arrive in a similar way at the claim that these objects were Neanderthal symbols. This expectation is incorrect, though. First, their claim that the ornaments concerned were Neanderthal symbols does not represent a conclusion inferred from data yielded by an analysis of relevant features of the personal ornaments involved. Clearly, the analysis of the physical features of the 'raw' objects associated with specific Neanderthals is not an analysis of the personal ornaments concerned, 'raw' archaeological objects and personal ornaments being different kinds of entities. The analysis of such ornaments is required by Soressi and d'Errico (2007: 9) to be 'rigorous'. According to them, '[a] rigorous analysis of potentially symbolic objects must be based on a study of several scales. The scale of the assemblage and of its context, as well as on both the macroscopic and microscopic scale'.[30]

Second, the claim that the ornaments concerned were Neanderthal symbols is not made within a conceptual framework that includes a general theory of symbolism comparable with the one included in The Basic Framework and The Extended Framework used in the debate about whether the Blombos beads had the status of symbols. Instead, the framework within which it is standardly claimed that Neanderthal ornaments were symbols consists of a stipulated definition or an implicit assumption, neither of which has been made responsible to relevant evidence. More specifically, this framework – to which I will refer for the ease of reference as 'The Received Framework' – includes:

The Received Framework

(a) The stipulated definition: 'being a symbol' is a defining property of personal ornaments;
(b) The implicit assumption: personal ornaments are inherently symbolic.

Made within this framework, the claim that Neanderthal personal ornaments are symbols is an axiomatic one. Or, as Zilhão (2012: 46) has put it, 'Neanderthal symbolism should be treated as fact not as hypothesis'. But how good is The Received Framework?

Having as its core components an arbitrary stipulation or arbitrary implicit assumption, The Received Framework is impoverished in a number of ways. First, it is heuristically sterile in the sense of not suggesting sharply focused questions for guiding the work on Neanderthal symbolism, questions such as: 'Did Neanderthal personal ornaments have the status of symbols or were they used for other semiotic – e.g., indexical – purposes?'; 'If these ornaments were symbols, what kind of symbols did they represent?'; 'Did these symbols have private or socially shared meanings?'; 'If the ornaments concerned were indexes, what kind of information was conveyed by them?'; 'Or did Neanderthals instead use their personal ornaments for a purpose other than a semiotic one?' In that it fails to throw up any sharply focused questions, The Received Framework fails to suggest in outline any potentially informative hypotheses

about the nature – symbolic or non-symbolic – of Neanderthal personal ornaments. Second, The Received Framework is also empirically sterile. It does not include a conception of what would count as evidence for or against claims assigning Neanderthal personal ornaments the status of symbols or other kinds of semiotic objects such as indexes.

Zilhão et al. (2010) and the other authors mentioned above are not exceptional in attributing symbolic status to specific Neanderthal personal ornaments within The Received Framework. As observed by Iliopoulos (2016: 244), '[p]rehistoric archaeologists generally treat early body ornaments, such as the Blombos beads, as inherently symbolic artefacts that were created by symbolically capable brains'. This necessary link between personal ornaments and symbols is also used by scholars to deny that specific groups of Neanderthals had symbols. For instance, Mellars (2010: 20148) takes over Higham et al.'s (2010) contention that Neanderthals who occupied the Grotte du Renne did not have personal ornaments, untenable as it has proven to be, and goes on to claim on this basis that these Neanderthals did not have symbols.

Exceptional, rather, are the scholars who deal with the possible symbolhood of Neanderthal personal ornaments within richer conceptual frameworks, Wynn et al. (2016) being exemplary in this regard. Convinced that Neanderthals made pendants, Wynn et al. (2016: 209) ask 'Were these symbols?' They pursue this question by invoking a distinction that is central to The Basic Framework: the Peircian distinction between symbols and indexes. Wynn and his co-authors proceed from the assumption that '[a]mong extant humans, at least, personal ornaments are occasionally symbols, but more often they act as indexes'. In support of the latter claim, Wynn et al. argue as follows:

> 'When students attend university sporting multiple piercings with rings and bars and other ornamental paraphernalia, the objects are rarely symbolic, but they do mark perceived social identity. They are indexes. Thus, there are actually no grounds for concluding that Neandertal pendants were true symbols; rather, they were more likely to have been indexes of social identity'. (Wynn et al. 2016: 209)[31]

Wynn et al. go on to ask whether this is not a kind of 'symbolic culture' in terms of a more generous definition of symbolic culture as any use of material culture to send messages about identity. Their answer is 'yes' but they caution that, in terms of this lax definition, all examples of body marking would constitute evidence for symbolic culture. Such examples include the indirect evidence for body painting associated with *Homo heidelbergensis* in Europe and Africa. Moreover, Wynn et al. (2016: 210) point out, if Neanderthals did indeed take their pendants to be indexes, there is a marked quantitative difference between Neanderthal index use and Aurignacian index use. More specifically, they assert that the Aurignacian record of some 10,000 years

duration has yielded thousands of beads and items of personal decoration whereas the Neanderthal record of more than 200,000 years has yielded fewer than ten.

Two aspects of Wynn et al.'s account invite commentary. First, relaxing the definition of symbolic culture in an ad hoc way does not represent a fruitful research strategy. Less restricted or more 'generous' definitions (or theories) of the nature and properties of Neanderthal symbols and symbolic culture make for less precise claims about these phenomena. The less precise a claim is, the more immune it is to disconfirmation. Furthermore, it is not clear how the more 'generous' definition of symbolic culture is to be reconciled with the Peircian distinction between symbols and indexes adopted by Wynn et al. It is accordingly understandable that Wynn et al. indicate between the lines that they have reservations about the more 'generous' definition of symbolic culture.

Second, at first blush the data from which Wynn et al. draw the conclusion that Neanderthal pendants were indexes do not represent strong evidence for it. That is, it is widely agreed that ethnographic data about the behaviour of modern humans – such as college students' sporting of piercings and other ornamental paraphernalia – represent relatively weak evidence for claims about archaic humans and other earlier hominins. The weakness of this kind of evidence results from ways in which behaviours and other attributes of Neanderthals and those of modern humans are likely to differ. Recall in this regard Moro Abadía and Nowell's (2014: 968) observation that it is quite problematic to attribute a particular function to Palaeolithic ornaments on the basis of a number of modern ethnographic examples. In similar vein, MacDonald and Roebroeks (2013: 107) caution that, in view of the long separation between Neanderthals and modern humans, both species might be expected to have undergone changes causing their behaviours to differ. Henshilwood and d'Errico (2011: 91) likewise warn against the abundant '. . . dangers associated with using the ethnographic present to explain the prehistoric past'. Moro Abadía and Nowell, MacDonald and Roebroeks, and Henshilwood and d'Errico are by no means the first scholars to have commented on the relative weakness of ethnographic evidence for claims about the prehistoric past. Sally R. Binford (1968a) is representative of a large group of scholars who did this much earlier. In her words:

> I would like to remark that the pertinence of ethnographic data to prehistoric research involves more than a 'logical exercise'. Pleistocene hominids cannot be assumed to be simply earlier representatives of living hunter-gatherers. This means that the use of ethnographic data from the Arunta or the Bushmen to elucidate a Lower or Middle Pleistocene way of life must take into account certain differences in the biological and psychological constitution of the hominids involved which have been suggested by recent work in palaeoanthropology. (Binford 1968a: 274)

To mention just one more cautionary voice: Reviewing important differences of an anatomical, cultural and behavioural sort between modern hunter-gatherers and early hominins, Robert Foley (1991: 221) remarks that '[t]here has ... perhaps been too great a readiness to extrapolate their [i.e., living hunter-gatherers' – R.B.] characteristics back into the remote past'.[32] It may be possible, however, that the ethnographic evidence for Wynn et al.'s (2016) attribution of indexical status to Neanderthal personal ornaments is stronger than it appears at first blush. That is, Neanderthals and modern humans may not differ cognitively in a way affecting their use of personal ornaments. The absence of such a difference cannot, however, be merely assumed; it needs to be established by empirical work.

3.6 Conclusion

The question of whether Neanderthals treated their personal ornaments as symbols has not yet admitted of a satisfactory answer. That is, satisfactory if the answer is to take the form of conclusions inferred from pertinent facts about Neanderthal personal ornaments within a conceptual framework that includes, amongst others, a sufficiently restrictive theory of symbolism. It is not possible to arrive at such conclusions within The Received Framework, the conceptual framework adopted standardly for dealing with the question of Neanderthal symbolism. This framework is too impoverished to permit such a conclusion.

There are two major causes of the impoverished nature of The Received Framework. The first takes the form of an insufficient recognition of the role of theory in work on prehistoric symbolism. In the phrasing of Nowell (2003: 11), '... similarly robust methodology and theory is lacking when it comes to discussing whether or not intentionally modified artifacts are indeed symbolic [where 'similarly' alludes to the methodology and theory adopted in discussions of the possibility that the objects recovered may have been modified by prehistoric people – R.B.]'. According to Nowell '[t]his is a theoretical lacuna in archaeology as a whole and is not limited to archaeologists studying the Paleolithic period'[33] More recently, Wynn et al. (2016: 209) have remarked in the context of their discussion of Neanderthal symbolism that '[a]lmost never does one encounter in-depth discussions of what a symbol is, what symbolism or symbolic culture are, or how these things might be recognized archaeologically'.[34]

The second cause of the impoverishment of The Received Framework resides in an insufficient understanding of the inferential nature of claims about prehistoric symbolism. As observed earlier by Bouissac (2003: 16), '[a]ssigning functions to prehistoric artifacts ... relies exclusively on inferential arguments'. Claims made within The Received Framework about the

symbolic status of Neanderthal personal ornaments are mistakenly judged to be ‘evidently correct’ or ‘true by their very nature’.

In contrast to The Received Framework, The Basic Framework is more adequate in both its minimal and its extended form. It includes a wider range of pertinent semiotic and other distinctions that may allow scholars to frame hypotheses about the purposes for which Neanderthals used their personal ornaments. Nevertheless, though richer in relevant theory, this framework is epistemologically underdeveloped. This is to say, it needs to tap into evidence from a range of pertinent sources, evidence derived from ethnographic data being of distinctly limited value.

All in all, legitimate doubts can be raised about the soundness of the symbol inference represented by CDE in Figure 3.1. This is not consonant with d’Errico’s judgement (2009: 108) that personal ornaments are a source of unquestioned evidence of the emergence of Neanderthal symbolism.

4 Producing Cave Art

4.1 The Cave-Art Inference

As noted in the introduction to Part II, Neanderthals are claimed to have behaved artistically, producing a hashtag engraving, red disks, red hand stencils, a ladder-shaped sign and red painted speleothems in assorted Iberian caves. These are interesting claims since, as noted in Section 3.1, there is believed to be a close link between the emergence of symbolism and the emergence of art. Recall in this regard that d'Errico (2009: 108) considers abstract or depictional representations, along with personal ornaments, to be the only unquestioned evidence for the emergence of symbolism. Consider further that, according to Lyn Wadley (2001: 203), probably all archaeologists are agreed that the presence of art and personal ornaments represents symbolic behaviour. More recently, Pike et al. (2012: 1409) have expressed a similar view of the link between prehistoric art and symbolism, claiming that '[p]aleolithic art is an exceptional archive of early human symbolic behaviour'. Furthermore, in the view of Hoffmann et al. (2018a: 912), '[c]ave and rock art constitutes particularly impressive and important evidence for symbolic behavior'.

Bringing this view of the close link between art and symbolism to bear on Neanderthal behaviour, Pike (in Callaway 2014) remarks that the hashtag pattern engraved on a wall of Gorham's Cave adds to the sparse but significant evidence of Neanderthal symbolic behaviour. In a similar vein, Zilhão et al. (2017: 37) state that 'given their dating and archeological associations, there can be no question that . . . the abstract engraving and ornamental use of raptor feathers documented at Gorham's Cave, stand for manifestations of Neanderthal symbolism'. The red disks and hand stencils found on walls of El Castillo Cave are likewise considered by Pike et al. (2012: 1411–12), d'Errico et al. (2016: 64) and others to be symbolic; a status also assigned by Hoffmann et al. (2018a) to the red hand stencil in Maltravieso Cave, the red scalariform (ladder-shaped) sign in the La Pasiega Cave and the red painted mineral deposits in three areas of the Ardales (or Doña Trinidad) Cave. These allegedly artistic objects – i.e., the hashtag engraving, red disks and hand stencils,

ladder-shaped sign and red painted mineral deposits – would indeed be important finds if they could be shown to have been produced by Neanderthals. For it is widely believed that Neanderthals produced little, if anything, in the way of art. In this regard, Davidson (2017: 32) states in his exhaustive bibliography of Palaeolithic art that '[u]ntil very recently it was generally believed that Neanderthals (before the Upper Paleolithic in Europe) made no art'. Roebroeks and Soressi (2016: 6376), alike, remark that 'from the hundreds of thousands of years in which Neandertals and their African near-modern contemporaries littered their landscapes with all kinds of artifacts, nothing has been retrieved that is in any way comparable to the visual representations ("art") and the general increase in diversity in material culture we see from around 40 ka onward'. This remark is consonant with the judgement by Trinkaus (2013: 414) that 'it is apparent that engraved designs, as with body decoration, occurred rarely and sporadically prior to the Upper Paleolithic'. These assessments of the dearth of Neanderthal art are of course not new. Thus, d'Errico et al. (2009: 30) have earlier summarised their overview of prehistoric abstract and depictional engravings by saying amongst other things that 'prior to 40 ka there are isolated depictions associated with Neanderthals in Europe, Neanderthals and modern humans in the Near East, and modern humans or archaic *Homo sapiens* in Africa'.

As observed by Davidson (2017: 32), however, since the late 1990s there have been many claims to the effect that artefacts associated with Neanderthals manifest forms of art. This is illustrated by Peresani et al.'s (2014: 233–34) list of claims attributing 'aesthetic' status to objects allegedly created by Neanderthals. These objects include, amongst others, carefully worked bifaces that retain a fossil in the middle, and the Mousterian Mask from La Roche-Cotard.[1] Many of the claims attributing aesthetic/artistic status to objects allegedly associated with Neanderthals have turned out to be controversial, though, and this is also the case with claims assigning symbolic status to such objects. It is accordingly interesting to examine some of the inferences of which such claims represent conclusions. Since inferences drawn about the status of the hashtag engraving in Gorham's Cave (henceforth 'the hashtag-engraving inference'), the red disks and hand stencils in El Castillo Cave (henceforth 'the red-disks-and-hand-stencils inference'), and the hand stencil, ladder-shaped sign, and red painted mineral deposits in Iberian caves (henceforth, for short, 'the Iberian-caves inferences') have elicited interesting commentary, I focus on these as instances of what may be called, collectively, 'the cave-art inference'. This commentary is exemplified by Rodríguez-Vidal et al.'s (2014) assertion that the hashtag engraving found in Gorham's Cave – depicted by Image 4.1 – is hugely significant from an evolutionary perspective:

Image 4.1 The hashtag engraving from Gorham's Cave, Gibraltar (Rodríguez-Vidal et al. 2014: 13303)

The engraving at Gorham's Cave represents the first directly demonstrable case in which a technically elaborated, consistently and carefully made nonutilitarian engraved abstract pattern whose production required prolonged and focused actions, is observed on the bedrock of a cave. We conclude that this engraving represents a deliberate design conceived to be seen by its Neanderthal maker and, considering its size and location, by others in the cave as well. It follows that the ability for abstract thought was not exclusive to MHs [modern humans – R.B.]'. (Rodríguez-Vidal et al. 2014: 13305)

The ladder-shaped sign, the red hand stencil and painted mineral deposits found in other Iberian caves are potentially even more significant, a point that will be fleshed out in Sections 4.3 and 4.4.

Before turning to specifics of the Gorham's Cave engraving, the view that Neanderthals created little in the way of art needs some elaboration. The term 'art' is used here in the restricted sense of 'cave art'. As explained by Moro Abadía and Gonzáles Morales (2010: 239), there has been a re-evaluation of personal ornaments, in terms of which, 'bodily ornaments are increasingly regarded as being as artistic and symbolically valued as other prehistoric representations'. And, consonant with this, 'those able to create ornaments are increasingly elevated by some to the status of "artists"'. Scientists who subscribe to this re-evaluation of bodily ornaments would consider Chapter 3 to be about a form of artistic behaviour by Neanderthals, although this would not affect the essence of the analysis presented in that chapter.

4.2 The Hashtag-Engraving Inference

Let us first consider the composite inference drawn from the hashtag engraving as a whole, turning after that to its individual components. The following figure shows how this inference is made up in outline:

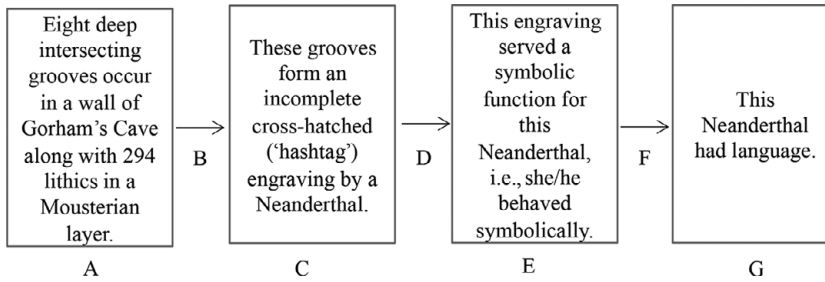


Figure 4.1 The hashtag-engraving inference

Taken as a whole, this composite inference comprises three inferential steps. The first one, represented by arrow B in Figure 4.1, is grounded in the data summarised in box A. More fully, as provided by Rodríguez-Vidal et al. (2014), these data include the following:

- Gorham's Cave is a sea cave located on the Mediterranean coast of Gibraltar, a small promontory situated at the southern extreme of the Iberian Peninsula.
- Thirteen intersecting lines occur on a flat area at the centre of 1-m^2 platform of the bedrock elevated 40 cm above the cave floor.
- Eight of the thirteen lines are deep grooves forming an incomplete criss-cross pattern, obliquely intersected by two groups of respectively three long and two short thin lines.
- The grooves appear to have been deliberately incised ('engraved') into the rock wall.[2]
- This groove pattern differs strikingly from the networks of natural cracks and fissures present on the exposed surfaces of the lime-dolostone of the cave.
- The grooves/lines occur in archaeological level IV of the cave, dated to plus 38.5 cal kyr BP, i.e., plus 38,500 calendar years before present.
- The lines/grooves are covered by a thin duricrust layer, i.e., a layer of mineral deposits left by evaporated water.
- 294 lithics (stone tools) were found at level IV in the cave.
- Based on the technology and typology of these stone tools, level IV of the cave is attributed to the Mousterian industry.

Which brings us to the question of the robustness of these data. Should crucial data turn out to be of dubious accuracy, the first inferential step (represented by arrow B in Figure 4.1) would lack sufficient factual grounding. As a matter of fact, various doubts about the grounding of this step have been expressed in expert commentary, including doubts about (a) the accuracy of

the dating of the groove/line pattern and (b) the attribution of the incised grooves to a Neanderthal. As for dating, according to Davidson (2014: 1) 'the radiocarbon dates obtained from the layer above the marks are rather mixed, with younger dates found below older dates, even in an area claimed to have been a hearth'. Pope (in Rincon 2014: 6), in turn, has remarked that '[t]he dates presented here [in Rodríguez-Vidal et al. (2014) – R.B.] are indirect, referring to material from within sediments covering the engravings and not the marks themselves'. Commenting in Jordans (2014: 2), Gamble has stressed the importance of correct dating, remarking that '[w]hat is critical ... is the dating [being accurate – R.B.]'.

Concerns about the accuracy of the dating of the engraving give rise, moreover, to doubts about the attribution of the grooves to Neanderthals. As stated by Pope (in Rincon 2014: 6), the essence of these is that the radiocarbon dates of the engraving fall in a period when both Neanderthals and modern humans were present in Europe: 'a period where we have unresolved "transitional" archaeological evidence difficult to attribute to either population'. Strengthening this uncertainty, is an observation by Davidson (2014: 3) about the stone tools recovered in layer IV of Gorham's Cave. These tools, he observes, are quite small in number and very few of them are 'diagnostic pieces'. This makes the attribution of these tools to Neanderthals – and thereby the association between the tools and the engraving – less than straightforward. Davidson (2014: 3), moreover, remarks that 'it continues to be a problem that in the east Mediterranean clearly Mousterian industries were associated with modern humans some time around 100,000 years ago'.

The remarks by Pope and Davidson are clearly pertinent, pointing to a weakness in the grounding of the first inferential step. The groove pattern may indeed represent an engraving,[3] as asserted in the conclusion included in the box C in Figure 4.1; but, counter to what is asserted in this conclusion, this engraving may have been made by a modern human. All in all, the empirical grounding of the first inferential step of the hashtag-engraving inference is less strong than it should be.

Which brings us to the matter of the symbolic status that has been assigned to the hashtag engraving found in Gorham's Cave. Recall that the second inferential step in the inference under consideration – represented by arrow D in Figure 4.1 – yields the conclusion that this engraving served a symbolic function for the Neanderthal who made it. As noted above, this conclusion has been drawn by, amongst others, Zilhão et al. (2017: 37), who take the abstract engraving found in Gorham's Cave to be a manifestation of Neanderthal symbolism. Now, to be able to claim that an artefact served a symbolic function, it is necessary to show that it had a specific meaning for its maker. What, then, is the meaning that the hashtag engraving had for its alleged Neanderthal creator? From comments made by various archaeologists, it is

clear that this is a mystery. Thus, according to Paul Taçon (in Jordans 2014: 1) '[w]e will never know the meaning the design held for the maker or the Neanderthals who inhabited the cave'. While believing that the engraving 'was done for a purpose', Francesco d'Errico (in Rincon (2014: 4), in turn, is of the view that '[i]t does not necessarily mean that it [i.e., the engraving – R.B.] is symbolic – in the sense that it represents something else'. Expressed in Burgen (2014: 1), Rodríguez-Vidal's view is that '[a]t this point we can only guess at its (i.e., the engraving's – R.B.) meaning'. Dibble (in Callaway 2014: 1) is even more sceptical, maintaining that '[i]t takes more than a few scratches – deliberate or not – to identify symbolic behaviour on the part of Neanderthals'. To conclude, Davidson (2014: 4) sets out in some detail a number of complex issues that have to be resolved in answering the question of whether an artefact such as the hashtag engraving 'could have had a symbolic intent'. The first is about repetition. Stated as a question, this issue is: 'Are there any instances of similar marks elsewhere in the area/region where the marks at issue have been found?' The second issue, Davidson (2014: 4) explains, is about how the makers of the marks concerned might have persuaded their companions about their intent. And the third issue springs from the claim that the Gorham's Cave marks indicate 'abstract thought and expression'. 'Most people who talk about such things do not define what they mean by "abstract"', Davidson (2014: 4) notes. His implicit suggestion is that these three issues remain unresolved in the case of the Gorham's Cave engraving.[4]

4.3 The Red-Disks-and-Hand-Stencils Inference

Discovered in 1903, El Castillo Cave is located on the side of Monte Castillo, near Puente Viesgo, in Cantabria, Spain. The cave is believed to contain one of the most significant Palaeolithic art ensembles in western Europe, including 'numerous engravings, drawings and paintings' (García-Diez et al. 2015: 137). Among these are some sixty hand stencils (García-Diez et al. 2015: 137) and a minimum of 317 red disks (d'Errico et al. 2016: 50).

The red disks occur mainly on twelve panels in three areas of the cave: the Gran Sala, the Galería de los Discos and the Galería Final (d'Errico et al. 2016: 50). These disks were produced by the artist blowing liquid pigment from the mouth directly or through a bone tube onto the cave walls. Some disks are believed to have been smeared by the artist using her/his fingertips after unsuccessful attempts to blow them onto areas that were difficult to reach (d'Errico et al. 2016: 63). Using U-series dating of the calcite deposits overlying a particular large red disk,[5] Pike et al. (2012) assigned it a minimal age of 40,800 years, declaring it to be 'the earliest dated example of European art' (Pike et al. 2012: 1412).

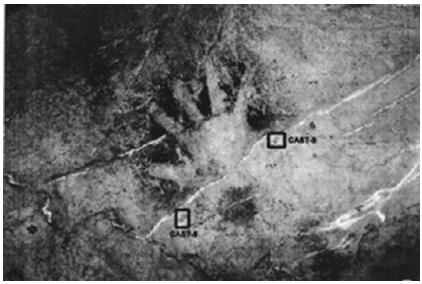


Image 4.2 A red hand stencil from El Castillo Cave Frieze G (García-Diez et al. 2015: 140)

Located mostly in multiple chambers in the initial and middle part of the cave, the hand stencils were made by placing a hand against a cave wall and blowing pigment onto it from the mouth, directly or by means of a hollowed instrument (García-Diez et al. 2015: 137). A hand stencil from the Panel de los Manos was dated by Pike et al. (2012: 1411–12) at minimally 37,300 years old, making depictions of the hand among the oldest art known from Europe. García-Diez et al. (2015: 139) believe all of the hand stencils on the Panel de los Manos to be more than 37,000 years old.[6]

This brings us to the question of how it may be inferred from El Castillo Cave's red disks and hand stencils (see Image 4.2) that Neanderthals who inhabited the cave behaved symbolically and had language. To be able to do this, one has to take at least the three inferential steps represented schematically as B, D and F in Figure 4.2:

Let us, then, consider the soundness of the inferential steps represented by arrows B and D, leaving step F for Chapter 7. The soundness of step B is considered to be dubious in a crucial way. It does not follow from the data summarised in Box A that the Neanderthals who occupied El Castillo Cave were necessarily the people who painted the red disks and hand stencils in the cave. Assuming the dating of these disks and stencils to be correct, it has been remarked by, for instance, Higham and Bicho (in Balter 2012: 2) that the cave may have been occupied by modern humans during the period 40,800–37,300 years ago, and that these humans, instead of Neanderthals, may have made the disks and stencils concerned. That is, it cannot be firmly inferred on the basis of these dates alone that Neanderthals – or, for that matter, modern humans – were the artists. Pike et al. (2012: 1412) are therefore justifiably cautious in using the qualification 'cannot be ruled out' when they conclude that 'because the 40.8-ky date for the disk is a minimum age, it cannot be ruled out that the earliest paintings were symbolic expressions of the Neandertals, which were present in Cantabrian Spain until at least 42 ka'. All in all, then, Pike et al.'s

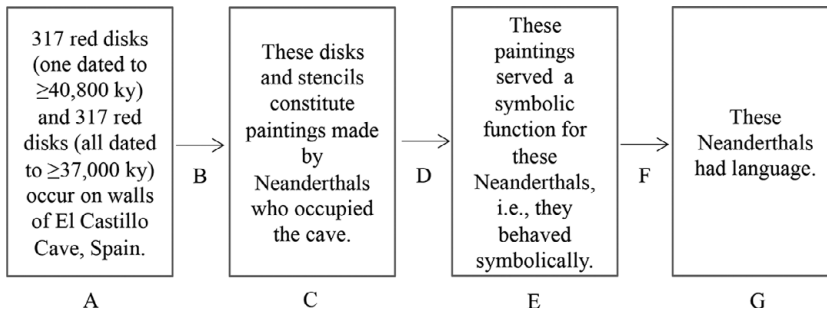


Figure 4.2 The red-disks-and-hand-stencils inference

(2012) dating of the red disks and hand stencils in El Castillo Cave does not provide particularly strong grounds for the conclusion that these paintings were made by Neanderthals. To more firmly ground this conclusion, one requires an additional kind of evidence: evidence that points to the existence of a link between Neanderthals and these paintings, without also being consistent with the existence of a link between modern humans and these paintings.

Let us assume, for the sake of argument, the conclusion that the disks and stencils under discussion were indeed paintings made by Neanderthals. Would it then be in order to draw from this conclusion the further conclusion that these disks and stencils had a symbolic function for the Neanderthals who created them? That is, would the inferential step represented by arrow D in Figure 4.2 be a sound one? There is a reason for doubting this. It flows from the condition that something cannot be considered a symbol unless it has a meaning. So, the question is 'What were the meanings that the red disks and hand stencils had for their Neanderthal creators?' Pettitt (in Marshall 2012: 3) has speculated that, since the hand stencils tend to occur in places that are difficult to reach, 'they are signposts, perhaps saying "do not go this way"'. Or, more profoundly, that since the hand stencils were often placed over cracks in cave walls, the cracks 'may have been seen as gateways to a supernatural world'. But this is pure speculation. The answer to the question about the meanings of the stencils is given by April Nowell (in Marshall 2012: 3): 'it is impossible to determine the symbols' meaning'. Which implies that inferential step D lacks the required underpinning.

4.4 The Iberian-Caves Inferences

The red ladder-shaped sign found in La Pasiega Cave (See Image 4.3), the red hand stencil in Maltravieso Cave and the red-painted mineral deposits in three

Image 4.3 A red scalariform (ladder-shaped) sign, panel 78 in hall XI of La Pasiega gallery C
(Hoffmann et al. 2018: 912)

areas of Ardales Cave are considered by Hoffmann et al. (2018a: 912, 913) to be significant finds in virtue of their age. Specifically, the results of their U–Th dating make these paintings older than 64,800 years. According to these authors, this means that the three paintings were made at least 20,000 years before the arrival of modern humans in Europe, estimated to have happened between 40,000 and 45,000 years ago. At the time of the creation of these paintings, they observe, Iberia was exclusively populated by Neanderthals. So, for Hoffmann et al. (2018a: 913), it follows that the artists were Neanderthals. This is indeed a potentially significant conclusion, since in the case of the hashtag engraving in Gorham's Cave and the red disk and hand stencils in El Castillo Cave, it is not certain whether the artists were Neanderthals or modern humans.

The inferential step from the data about the age of the paintings concerned to the conclusion about the identity of the artists may be represented by arrow B in Figure 4.3. Again, I will subsequently turn to the inferential step represented by arrow D, discussing in Chapter 7 the inferential step represented by arrow F.

The soundness of inferential step B clearly depends to a large extent on the accuracy of the dating of the paintings concerned. Thus, to Harold Dibble (in Appenzeller 2018: 853), 'the biggest question is how good is the dating'. On this matter, opinions differ. The dates obtained by Hoffmann and his colleagues are accepted without reservations by various experts. This is

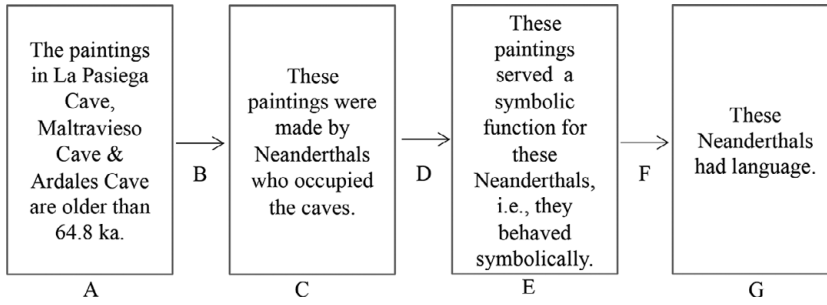


Figure 4.3 The Iberian-caves inference

evidenced by Hublin's remark (in Appenzeller 2018: 852) that '[m]ost of my colleagues are going to be stunned [by Hoffmann et al.'s account – R.B.]'. It is further reflected in Roebroeks's judgement (in Gascone 2018: 4) that Hoffmann et al.'s discovery 'constitutes a major breakthrough in the field of evolution studies'. Both Hublin and Roebroeks clearly accept the dating of the paintings by Hoffmann et al.

Other scholars treat Hoffmann et al.'s (2018a) findings with reservation, though. Maxime Aubert, Adam Brumm and Jillian Huntley (2018) have two major reservations. The first is that the data furnished in Hoffmann et al. (2018a) 'do not adequately explain the materiality of the red marks in question. Consequently, it is not clear to us that these red marks are from paint or relate to rock art production' (Aubert et al. 2018: 214). They suggest that red marks can occur naturally on walls of limestone caves from natural causes. For instance, through organic compounds or as oxides transported in ground water from clays and soils above Ardales Cave. The presence of red paint on some cave decorations may also be explained, Aubert et al. (2018: 216) maintain, 'by one or more secondary transfer events, such as painted skin or clothing [of Neanderthals – R.B.] fortuitously coming into contact with cave walls'.

Aubert et al.'s (2018: 215) second, and main, reservation is of a methodological sort: there are potential problems with the sampling methodology used by Hoffmann et al. 'to infer extremely old minimum ages for clearly discernible art motifs'. It is possible, according to them (2018a: 216), that Hoffmann et al. unintentionally dated the carbonate deposits that were part of the rock face or 'canvas' upon which the images were created and which may be older than the artwork. Elaborating on this, Aubert et al. (2018: 216) observe that Hoffmann et al. (2018) 'did not cut a section through the carbonate deposits into the "canvas" nor did they completely expose the underlying paint'. This leads Aubert et al. (2018: 216) to conclude that Neanderthals could have made rock art of some kind but that this has not been sufficiently demonstrated by Hoffmann et al.'s (2018a) study.[7]

Commenting from yet another perspective, Clive Finlayson (in Sample 2018: 3–4) finds it impossible to rule out the possibility that the originators of the Iberian rock art were not Neanderthals but rather 'the mysterious Denisovans or some other yet unknown species'. Unlike the findings by Hoffmann and his co-authors, however, Brumm's and Finlayson's reservations do not represent results of empirical analysis. So, the soundness of inferential step B in Figure 4.3 is suspect.

The question about inferential step D is: 'Why is it in order to infer that the paintings in the caves concerned served a symbolic function for the Neanderthals who made them?' That is: 'What is the warrant for this step?', and 'By which theory of the link between prehistoric paintings and symbolism is this warrant underpinned?' Instead of addressing these questions in a direct way, Hoffmann and his co-authors do two other things. First, they (2018a: 914) assert that '[t]his cave painting activity constitutes a symbolic behaviour **by definition** [emphasis added – R.B.] and one that is deeply rooted'. But to maintain this is to invoke an adapted version of a stipulation that forms part of The Received Framework discussed in Section 3.5.2. Recall that this stipulation deals with the alleged symbolic status of personal ornaments, saying that 'being a symbol' is a defining property of personal ornaments. As adapted by Hoffmann et al., this stipulation says that 'being a symbol' is a defining property of prehistoric paintings (too). To assert this is to reduce the symbolic status of prehistoric paintings to a non-empirical matter. Resorting to stipulation is not a strategy used in a form of inquiry about gaining factual knowledge of what is out there in the world.

Second, there is Hoffmann et al.'s assertions of what the meaning of the hand stencils in Maltravieso Cave may have been. To their credit, they realise that these hand stencils had to mean something in order to have had symbolic status for the Neanderthals concerned. And Hoffmann et al. assert that:

> Because a number of hand stencils seem to have been deliberately placed in relation to natural features in caves rather than randomly created on accessible surfaces (31), it is difficult to see them as anything but meaningful symbols placed in meaningful places. (Hoffmann et al. 2018a: 914)

These assertions have a number of unwelcome implications. On the one hand, they imply that the hand stencils that were not deliberately placed in allegedly meaningful places lacked a meaning, and, so, cannot be considered to have been symbols. To be consistent, this point should be generalised to other prehistoric paintings that were not placed in allegedly meaningful places. On the other hand, and more fundamentally, the quoted assertions by Hoffmann et al. boil down to an ad hoc relaxation of Peirce's theory of the distinguishing properties of symbols. In terms of the laxer theory, even objects to which no specific meaning can be assigned will qualify as symbols as long

as they occur in allegedly meaningful places. This is an undesirable consequence. For, as used here, 'meaningful place' is an obscure notion that may be invoked in an unconstrained way. In the absence of constraints on the category of 'meaningful places', this notion cannot be used to make empirical claims about objects that are and objects that are not (prehistoric) symbols. Finally, claims attributing a particular meaning to a specific place need empirical support. They cannot be mere speculations such as that the cracks in walls of Maltravieso Cave 'may have been seen as gateways to a supernatural world' (Pettitt in Marshall 2012: 3).[8]

4.5 Conclusion

What in essence, then, does the account in the preceding sections say about the soundness of the inferences drawn from the allegedly artistic objects found in Iberian caves? That there are pertinent reasons to treat with caution the conclusion that these objects served a symbolic function for the Neanderthals who allegedly created them. These reasons derive from the following main concerns:

Main Concerns about the Symbolic Nature of the Iberian Finds

A *The hashtag engraving in Gorham's Cave:*
- (a) The dating of the groove/line pattern is of dubious accuracy.
- (b) Given the dating of the engraving, the incised grooves may have been made by a modern human instead of a Neanderthal.
- (c) The meaning of the engraving is a mystery.

B *The red disks and hand stencils from El Castillo Cave:*
- (a) Given the dating of these objects, they may have been created by modern humans instead of Neanderthals.
- (b) The meaning of these objects is not known.

C *The paintings in the Caves of La Pasiega, Maltravieso and Ardales:*
- (a) The dates assigned to these objects may be those of the calcite crusts that overlie the paintings rather than the paintings themselves.
- (b) Instead of providing empirical evidence for attributing symbolic status to the activity by which the paintings were created, it has been stipulated that this activity constitutes symbolic behaviour by definition.
- (c) The obscure and unconstrained notion of a 'meaningful place' is invoked to assign a meaning to some of the stencils concerned.

Viewed from an inferential perspective, these concerns are of two sorts. Concerns *A*(a) and (b), *B*(b) and *C*(a) are doubts about the firmness of the empirical grounding of the first inferential step represented by arrow B in Figures 4.1, 4.2 and 4.3. Concerns *A*(c), *B*(b) and *C* (b) and (c), in turn, say that the second inferential step – represented by arrow D in these figures – lacks the right kind of warrant. To the extent that the concerns A–C are genuine, they mean that it is less than sound to infer from the artistic objects found in the

Iberian caves concerned that their Neanderthal inhabitants were capable of symbolic behaviour. There is also a more general reason for doubting the soundness of the cave-art inference. Specifically, in terms of some recent theories of the emergence of art, it does not necessarily reflect a form of symbolic behaviour or require the existence of a symbolic mind. For instance, Martin-Loeches (2017: 114) is of the view that 'the symbolic frame seems to provide neither sufficient nor necessary explanation for the emergence of art'. He maintains that in cognitive sciences the symbolic perspective is being progressively replaced by current models of embodied cognition. According to such models, mental representations are directly embodied and grounded in sensorimotor experience. In line with this view, he (2017: 127) maintains that the emergence and evolution of artistic behaviour may be better understood by focussing on both perceptual and, particularly motor aspects – biomechanics and neural constraints – of this human trait. He, accordingly, provides for 'art without a symbolic mind'.

The view that early art was not necessarily symbolic is also articulated in an interesting way in a chapter co-authored by Thomas Wynn and Tony Berlant (to appear). With the aid of concepts derived from neuroaesthetics, they make an analysis of a selection of exceptional Acheulean handaxes, illustrating their discussion with the aid of images such as Image 4.4.

From data yielded by their analysis of the handaxes concerned, Wynn and Berlant draw the following general conclusions:[9]

> Conclusion 1: '[H]andaxes were in fact aestheticized artifacts'. (Wynn and Berlant to appear: 32)
>
> Conclusion 2: 'Despite its possible role in indexical reference, the handaxe aesthetic was arguably pre-symbolic'. (Wynn and Berlant to appear: 33)[10]

As for Conclusion 1, it is drawn by Wynn and Berlant from data about five features displayed by handaxes, such as those recovered at Boxgrove on the southern coast of Britain.[11] Representing visual effects exploited by knappers to produce pleasing results to them and their kin, these five features are:

> [the] imposition of basic **Gestalt forms**, especially symmetry; **peak shift**, initially via size exaggeration; **proto-typicality**, via regularization of form; **familiarity**, as represented by community styles; and **framing**, use of the handaxe form to focus visual attention on inclusions [of, for instance, crystals, fossils, holes, faces – R.B.]. (Wynn and Berlant to appear: 14)

Wynn and Berlant (to appear: 23) observe that a giant handaxe from Olduvai Gorge demonstrates clear bilateral symmetry and is overdetermined as a tool. That is, 'a hominin knapper invested more time and energy to achieve a pleasing form than was necessary for its functionality'. They also (to appear: 24) find it telling that 'overdetermination accompanied handaxes from the very

Image 4.4 A Neanderthal handaxe, Moyenville, France, ca. 100,000. Flint 13.9 × 10.7 cm
(Berlant and Wynn 2018: 152)

beginning'. This suggests to them that 'aesthetic appraisal was an established component of the way of life of *Homo erectus* from the outset'.

Turning to Conclusion 2, Wynn and Berlant (to appear: 23) infer it from the absence of a particular kind of evidence. Thus, they (to appear: 30) assert that '[t]here are no grounds for concluding the handaxes acted as true symbols, in the sense of standing for something else in an arbitrary way'. They (to appear: 31), moreover, observe that '[w]hat is perhaps most remarkable about the handaxe age is the almost complete absence of anything other than handaxes that could reasonably be interpreted as a symbolic artefact'. According to them (to appear: 32), '[t]here were no abstract meanings to consider, indeed no symbols in the narrow sense'. In addition, they (to appear: 33) state that '[t]here is no evidence that handaxe aesthetic experience [of early hominins – R.B.] included the rich, multi-layered symbolic milieu that is typical of all modern artistic endeavours'. Handaxes, Wynn and Berlant (to appear: 30) maintain, may rather have played the role of indexes.[12] That is, handaxes could have stood for their maker or user. And, according to Wynn and Berlant (to appear: 30) this is where aesthetics enters the equation: '[p]roducing a more aesthetically pleasing handaxe enhanced the indexical message'.

In sum, it cannot be simply assumed that prehistoric aesthetic or artistic artefacts were symbolic. To be able to assign symbol-hood to such artefacts, it needs, among other things, be ruled out that they were treated as indexes by the prehistoric people who produced them. This applies also to the allegedly artistic objects that feature in all the cave-art inferences.

5 Beautifying Bodies

5.1 The Body-Decoration Inference

There are archaeologists who hold the view that some Neanderthals used pigment for 'decorating', 'beautifying' or 'painting' their bodies, and that they did this for a symbolic purpose. Thus, according to d'Errico and Soressi (2002: A13), '[t]he systematic use of pigment is generally considered evidence for symbolic thinking and a hallmark of behavioral modernity'. Affirming this view, Soressi and d'Errico (2007: 2) have asserted more recently that 'it now appears clear that there is a true Mousterian pigment technology, and that their [sic] use in symbolic activities is highly probable', an assertion repeated by d'Errico (2008: 173) elsewhere. This assessment of the use of pigment for body decoration is endorsed by Zilhão when he asserts that:

> [t]he conclusion that Neandertal society was symbolically organized is further strengthened by results from use-wear analyses of hundreds of chunks of black pigment from another and even earlier French cave site, the Pech de l'Azé. These analyses concluded that they were pencils used for body painting (Soressi & d'Errico 2007). Zilhão (2011: 121)

Taking an additional inferential step, d'Errico et al. (2009: 25) contend that 'body decoration can be regarded as a proxy for language abilities.'

The composite inference – the body-decoration inference – which is implicit to these assertions by Soressi, d'Errico and Zilhão may be reconstructed schematically as shown in Figure 5.1.

Fleshing out the content of box A in Figure 3.2, according to d'Errico and Stringer (2011: 1065) '[p]igments, mostly black but also red, have been used by Neanderthals in Europe ... since approximately 300 ka ... but their use became systematic only after approximately 60 ka'. As for the sites $S_1,\ldots,S_n$ referred to in box A, d'Errico et al. (2009: 23) assert that they include more than forty Mousterian sites. Important among these are Pech de l'Azé I and Pech de l'Azé IV, located in the Périgord region in southern France. In addition, black as well as red pigments, some shaped by grinding into the form of crayons, were recovered in the Chatelperronian layers of Grotte du Renne, Arcy-sur-Cure (d'Errico et al. 2009: 25; Soressi and d'Errico 2007: 7;

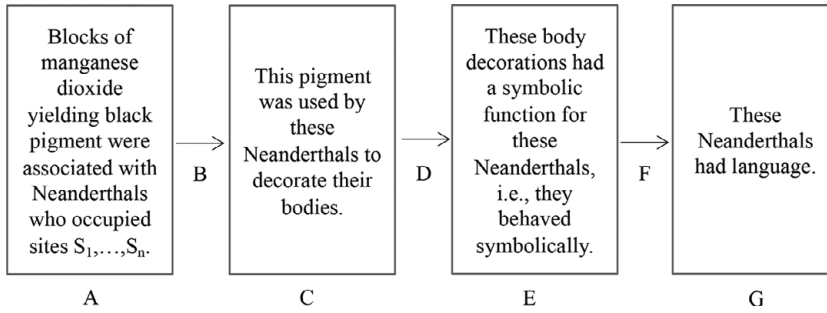


Figure 5.1 The body-decoration inference

see also the introduction to Part II). Along with blocks of manganese dioxide, archaeologists found objects described by d'Errico et al. (2009: 23) as 'stones used to grind or crush pigment'. The powder produced by scraping, grinding and abrading of such blocks was used by Neanderthals for body painting, according to Soressi and d'Errico (2007: 7).

5.2 The Step from Pigment Use to Body Decoration

This brings us to the soundness of the inferential steps represented by arrows B and D in Figure 5.1. Consider again step B, which yields the conclusion, C, that the black pigment was used by the Neanderthals concerned for body decoration. This step is distinctly controversial. To begin with, there are concerns of a general sort about its soundness. For instance, as is clear from Lyn Wadley's (2001: 204, 2003:249) discussion of relevant literature, pigment has many uses – some ethnographic, others prehistoric – besides body decoration. Thus, pitch has been used as a medical substance that arrests bleeding, as an antiseptic and deodorant, as a stuff protecting the body against cold, sun and insects, as a tanning agent for softening hides and preserving leather and as an ingredient of mastic material ('super glue') used for hafting artefacts.[1] Since pigment is known to have several 'secular uses', Wadley (2001: 204, 2003:249) considers it unwise to assume *ritual* use from the mere presence of pigment in archaeological sites.[2]

More specific concerns about the soundness of inferential step B spring from recent experimental work done by Heyes et al. (2016) on manganese oxides ('black blocks') recovered at Mousterian, i.e., Neanderthal, sites in France. Their (2016: 1) combustion experiments and thermo-gravimetric measurements have shown that manganese dioxide promotes the ignition and combustion of wood, 'reduces wood's auto-ignition temperature and substantially

increases the rate of char combustion'. There being archaeological evidence for fire places and for the conversion of manganese dioxide to powder, these authors argue that the Neanderthals at Pech-de-l'Azé I used manganese dioxide in fire-making and produced fire on demand.

Heyes et al. (2016: 6–7) do not exclude the possibility that manganese dioxide was used for decoration and social communication; but, they (2016: 6) point out, '[t]here is apparently no decorative reason for Neanderthals to have favoured manganese oxides over soot and charcoal, or manganese dioxide over other manganese oxides'. In the view of Heyes et al. (2016: 1), 'soot and charcoal were readily available, whereas obtaining manganese oxides would have incurred considerably higher costs'. Heyes et al. (2016: 6), accordingly, hypothesise, that 'fire-making was manganese dioxide's most beneficial distinguishing attribute available to Neanderthals'.

In sum, since Neanderthals may have used black pigment for various purposes other than body decoration, there are genuine doubts about the soundness of the inferential step represented by arrow B in Figure 5.1.[3]

5.3 The Step from Body Decoration to Symbolic Behaviour

Before turning to the defence by d'Errico and others of inferential step B, however, it is necessary to consider the soundness of the inferential step represented by arrow D in Figure 5.1, since in this defence they do not distinguish clearly between steps B and D. Recall that inferential step D starts from the conclusion that Neanderthals used black pigment to decorate their bodies and ends up with the further conclusion that the decorations served a symbolic function. Steven Mithen (2007: 322), for one, does not accept the latter conclusion. Using the expression 'body painting' instead of 'body decoration', he argues as follows:

> Given that the Neanderthals have left no traces of pigment on cave walls or artifacts, the most likely explanation is body painting. This need not imply the creation of symbolic images. We can guess that Neanderthals were white-skinned, having evolved in high latitudes, and we know that they were big game hunters. It seems entirely plausible that the paint was simply used to camouflage their [white – R.B.] bodies. Alternatively, or perhaps in addition, it may have been used for cosmetic reasons – to emphasize an aspect of one's appearance as a means of sexual attraction. (Mithen (2007: 322)

Mithen expects in addition that, if Neanderthals used pigment for a symbolic purpose, a wider range of pigments should have been represented at their sites, including modules of ochre to create red paint. Mithen's reason for expecting this is that red is taken to be the colour that dominates the earliest symbolic activities of modern humans in Southern Africa. Moreover, red has far more evocative connotations than black, Mithen believes.

The doubts expressed by Wadley about the view that prehistoric people used pigment for body decoration instead of utilitarian purposes – and in so doing engaged in a form of symbolic behaviour – are not shared by d'Errico and his various co-authors. On the one hand, d'Errico et al. (2009: 20) caution against 'automatically equating' the discovery of pigments with symbolism. They judge it 'crucial' that, before this could be done, all archaeological aspects linked to the use of pigments would need to be documented and examined. On the other hand, however, d'Errico and Stringer (2011: 1065) caution against citing ethnographic evidence in support of a functional interpretation of the use of pigmental material. In their view, the debate between archaeologists who attribute a functional use to pigment and those who assign a symbolic role to it 'has probably become unnecessarily polarised'. In support of this judgement, they maintain that:

> Ethnographically, the symbolic/functional divide would be an alien concept to most contemporary hunter-gatherer societies, who do not perceive such distinctions between material, actions and causality. Symbol use and its material expressions are ultimately functional in the sense of creating or marking individual and group identities and as such, have potential adaptive value by enhancing group cohesiveness. In other words, a systematic and purely functional use of pigments is difficult to conceive. (d'Errico and Stringer 2011: 1065)

In a similar vein, d'Errico et al. (2009: 20) have earlier remarked that exclusively functional uses of pigment are very rare and may not exist at all. They assert, though, that it may have been different in the past: the purposes for which Neanderthals used pigment are not necessarily the same as those for which ethnographically attested traditional societies use it. Specifically, from the fact that these societies use pigment for a symbolic purpose it does not follow that Neanderthals also used pigment for such a purpose. d'Errico et al. (2009: 20), however, dilute this point by asserting that the same may be said of any other category of material culture, a 'stand [that] comes down to denying the possibility of inferring the past from the archaeological record'. Recall, however, that in another connection Henshilwood and d'Errico (2011: 91) warn against the abundant 'dangers associated with using the ethnographic present to explain the prehistoric past' (see Section 3.5.2). This warning, of course, bears negatively on the soundness of inferential steps B and D of the body-decoration inference.

5.4 Conclusion

It is doubtful whether populations of Neanderthals used the black pitch derived from manganese blocks for a symbolic purpose. That is, it has not been ruled

out that they actualy used this pitch for one or more utilitarian purposes. This means that the inferential step represented by arrow B in Figure 5.1 has not been shown to be sound. As a consequence, the conclusion of this step, presented in box C, does not provide the solid grounding required by inferential step D. All in all, the body-decoration inference does not strengthen the case for attributing symbolic behaviour to some Neanderthals.[4]

6 Burying the Dead

6.1 The Deliberate-Burial Inference

The mortuary behaviour of Neanderthals has been studied in depth and debated at length by scholars in various branches of prehistory. Three of the claims made in this body of work are particularly germane to the concern of the present book with alleged forms of Neanderthal symbolic behaviour:

Three Claims about Neanderthal Burials, Symbolism and Language

Claim 1: Some Neanderthals, at some times, deliberately buried some of their dead.

Claim 2: These Neanderthals engaged in a form of symbolic behaviour.

Claim 3: These Neanderthals had language.

Claim 1 is made by Pettitt (2011a: 103) in his landmark monograph on the Palaeolithic origins of human burial. According to him (2011a: 80), '[i]t is probably fair to say that most scholars, except Gargett (1989, 1999), accept that *some* Neanderthals received deliberate burial after death'.[1] Pettitt cautions that unqualified generalisations of the 'Neanderthals did bury their dead' variety are not justified. Neanderthals, Pettitt (2011a: 136) observes, cannot be treated from a behavioural perspective as one monolithic archaic species: their treatment of the dead exhibits inter- and even intra-regional differences.[2]

Considerably fewer scholars subscribe to Claim 2, and some of those who do are careful to note the difficulties in viewing the burial of the dead by Neanderthals as a form of symbolic behaviour. Thus d'Errico et al. (2003) assert in this regard that:

> [a] reappraisal of the oldest known funerary practices is crucial for proposing a reliable scenario for the origin of symbolism and language. Primary burials are regarded by many researchers to be proof of symbolism. However, the intentional character and symbolic significance of burials prior to 30,000 years, especially those of Neandertals, has been the subject of intense debate over the past decades (Davidson and Noble, 1989; Gargett, 1989, 1999; Noble and Davidson, 1996; Stringer and Gamble, 1993). (d'Errico et al. 2003: 25)

Having said this, d'Errico et al. (2003: 26) nevertheless proceed to claim that the digging of twenty small burial pits at La Ferassie Cave (at Savignac-de-Miremont in the Dordogne department, France) represents behaviour that '... suggests symbolic action'. These authors (2003: 27) maintain that the observation that mortuary practices involving inhumations of single individuals are widespread among modern ethnographic societies '... cannot be used to deny the symbolic character of Neandertal burials'. More recently, Rendu and thirteen co-authors have expressed support for the claim that Neanderthals' burial of the dead can represent evidence about their symbolic behaviour, maintaining that:

> [i]n the light of our work at La Chapelle-aux-Saints and following the recent revision of the Roc-de-Marsal child burial, it now appears that a general reassessment of European Mousterian burials needs to be undertaken with the aim of furnishing new scientific arguments and evidence relevant to the ongoing debate surrounding Neandertal symbolic behavior. (Rendu et al. 2014: 85)[3]

Rendu et al. (2014: 81) assert this against the background of the position that Neanderthals' burial behaviour forms part of a 'cultural package' that includes also their use of pigment and decorative feathers, their collection of exogenous fossil shells and their preference for coloured shells in Middle Palaeolithic layers. According to them (2014: 81), the discovery in 1908 of a nearly complete Neanderthal skeleton in a pit dug within the deposits of the bouffia Bonneval at La Chapelle-aux-Saints for the first time clearly raised '... the hypothesis of the possible existence of intentional burials, and, therefore, symbolic capacities in an Upper Pleistocene human group other than anatomically modern humans' (See Image 6.1).

Image 6.1 A reconstruction of the skeleton of The Old Man in The Museum of Neanderthal Man at La Chapelle-aux-Saints, France
(image courtesy of The Museum of Neanderthal Man)

Turning to Claim 3, this forms part of d'Errico et al.'s (2003: 25) view that a reappraisal of the oldest known funerary practices is crucial for proposing a reliable scenario for the origin of symbolism and language. And they concretise this view with reference to one of the Neanderthal burials found at La Ferassie Cave: the skeleton of a foetus. It was found in a pit along with three flint flakes – regarded by d'Errico at al. as being a possible gift – at the surface of the pit. The fact that the Neanderthals who were responsible for the burial took care of such a young individual is considered by d'Errico et al. (2003: 26) to be '. . . indicative of human emotion, and certainly of a high degree of social discourse, which is difficult to conceive without the existence of a complex language'.

The view that language is linked to deliberate burial is held by scholars outside the d'Errico group as well. Thus, the practice of systematic and deliberate burial shows, according to Colin Renfrew (2015: 4), a coherent response to the phenomenon of death that must derive from inherited experience. This, he maintains, is a social response, '. . . and one that must be dependent on the shared experience and shared memory that the use of developed language makes possible'. Referring to Jane Renfrew's (2009) re-examination of the evidence about Neanderthals' alleged symbolic behaviour, he states that burials of *Homo neandertalensis* are found in Europe before the appearance there of our own species. This too 'is suggestive of self-awareness and some linguistic capacity', Colin Renfrew (2016: 4) contends.

Claims 1, 2 and 3 represent three conclusions forming part of a composite inference – henceforth 'the deliberate-burial inference' – that will be analysed below. Schematically, this inference is shown in Figure 6.1.

At issue here is the soundness of the inferential steps represented by the arrows B and D in Figure 6.1; the soundness of inferential step F will be dealt with in Chapter 7.

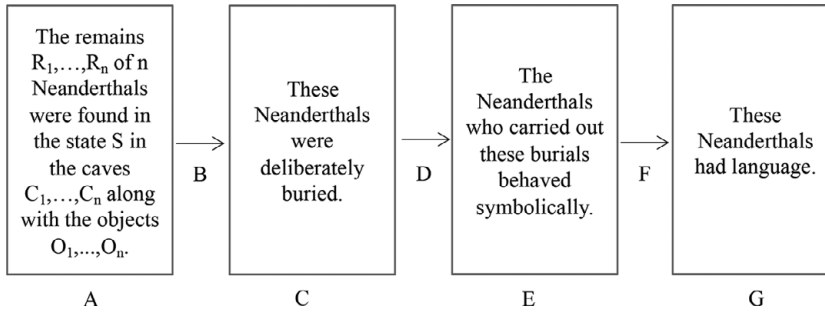


Figure 6.1 The deliberate-burial inference

6.2 The Step from Skeletal Remains to Deliberate Burials

Starting from the data about recovered Neanderthal skeletal remains provided in outline in box A in Figure 6.1, the inferential step represented by arrow B ends with the conclusion, stated in box C, that the Neanderthals concerned were deliberately buried. The data include the following:

- *The number (n) of Neanderthals*: On a conservative estimate, there are skeletal remains of under 100 Neanderthals believed to have died in the Late-Middle and Upper Pleistocene in Europe and western Asia (Pettitt 2011a: 97).
- *The identity of some of the caves* $C_1,\ldots,C_n$: The following caves are considered to be of special importance: La Ferrassie 1–8 (France), La Chapelle-aux-Saints (France), La Roche-à-Pierrot (Saint-Césaire, France), Le Regourdou (France), Kebara 1 and 2 (Israel), Amud 1, 7 and 9 (Israel), Tabun C1 (Israel), Shanidar IV, VI, VII and VIII (Israel) and Dederiye 1 (Syria) (Pettitt 2011a: 103).[4]
- *Examples of remains* $R_1,\ldots,R_n$ *and the state (S) in which they were found*: An adult male, near-complete skeleton found in a natural or artificial depression at La Ferrrassie 1, with three large, flat stones placed below the head and on either side of the torso; a neonate partial skeleton placed in a grave cutting in La Ferrassie 4 (rock shelter); a relatively complete adult skeleton laid on the left side in an apparent tomb at Le Regourdou, covered with limestone paving and a cairn, in apparent association with a buried brown bear; an adult male partial postcranial skeleton, laid on its back in a grave cutting at Kebara KMHII; a ~two-year-old infant, near-complete articulated cranial and postcranial skeleton, lain on its back, arms extended and legs flexed, at Dederiyeh I, its head possibly lain on a stone slab, along with triangular flint found near its chest (Pettitt 2011a: 83, 84, 85).[5]
- *Examples of the objects* $O_1,\ldots,O_n$ *found along with the remains*: Three flint scrapers at La Ferrassie 5; one flint point and two scrapers at La Ferrassie 6; the maxilla (upper jawbone) of a red deer at Amud 7; a rhinoceros tooth at Kebara I; fourteen Mousterian lithics, >100 waste flakes, and fauna found in the pit at Dederiyeh 2. (Pettitt 2011a: 82, 84).

This brings us to the soundness of inferential step B: why is it warranted to infer from data about the skeletal remains of specific Neanderthals that they were deliberately buried? This question is about how two distinct ontological domains are interrelated: the physical domain of Neanderthal skeletal remains and the cultural domain of Neanderthal burials. To be able to warrant inferential step B, one needs a theory of the way in which these domains hang together. Such an account would provide the bridge needed to move inferentially from data about Neanderthal skeletal remains to conclusions

about Neanderthal burials. The required bridge theory is not explicitly stated as such in the literature. One finds instead arguments about whether particular clusters of Neanderthal bones were or were not deliberately buried. As evidenced by accounts of d'Errico and Vanhaeren (2016), Dibble et al. (2015), Egeland et al. (2018), Gargett (1989, 1999, 2001), Pettitt (2011a, 2011b), Rendu et al. (2014), Riel-Salvatore and Clark (2001), Sandgathe et al. (2011), Wynn and Coolidge (2012: 105–12), Zilhão (2015) and others, these arguments draw on criteria for deliberate burials. Some authors state these criteria in the form of explicit questions. For instance, Sandgathe et al. (2011: 246–51) adopt the following criteria in arguing that the Roc de Marsal Neanderthal infant was not deliberately buried: 'Were the remains found in an anthropogenically – or naturally – formed pit?'; 'Was the body situated at the base of the cavity or were there sediments beneath it?'; Were the remains in a unique stratum – i.e., intentional infill?'; 'Is the skeleton complete and articulated, or are portions disarticulated and missing?'; 'Are the remains in a location that is more susceptible to particularly rapid sedimentation processes that could bury them more rapidly?'; 'Is there evidence in the sediments of post-depositional processes that might explain missing or disarticulated elements?' 'What is the position of the body?'; 'Was the body accompanied by special objects – grave goods?'[6]

In their varying formulations, these criteria cannot stand on their own. They represent implicit warrants for inferential step B in Figure 6.1, the step that starts out from data about specific Neanderthal remains and ends with the conclusion C that these remains were or were not deliberately buried. And as warrants, these criteria need to be underpinned by a bridge theory of the properties of deliberate Neanderthal burials, a bridge theory that includes claims such as the following:

Claims about the Features of Deliberate Neanderthal Burials

(a) The skeletal remains are located in pit dug by Neanderthals.
(b) In the case of a full skeleton, it lies in a flexed position.
(c) In the case of a full skeleton, it is complete and articulated.
(d) The skeletal remains occur in a unique stratum, i.e., an intentional infill.
(e) The burial is carried out rapidly.
(f) The skeletal remains are accompanied by grave goods.

But what kind of claims are (a)–(f) and similar other ones? Are they indeed the kind of hypotheses that make up an empirical theory? If they are, can they be subjected to empirical testing and disconfirmation? By what kinds of evidence can they be controverted? Or, are claims such as (a)–(f) in essence no more than stipulations making up a definition not responsible to empirical evidence? The answers to these questions bear on the strength of the warrant for inferential step B. If the claims concerned are testable hypotheses and if they are

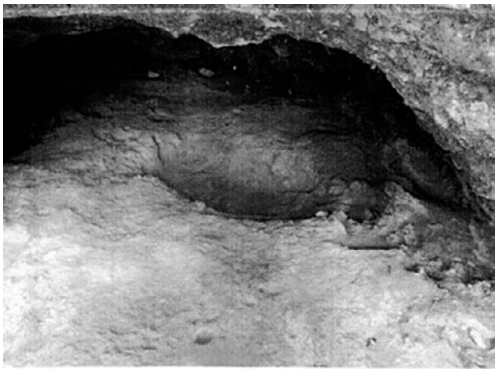


Image 6.2 The burial pit in the bouffia Bonneval at La Chapelle-aux-Saints, France
(photo courtesy Cedric Beauval)

supported by empirical evidence – thus constituting a bridge theory – then the warrants derived from them would be strong. But if these claims are mere stipulations included in a definition, the warrants concerned would lack the required strength. These two possibilities are not discussed in an explicit way in recent literature. This is remarkable given the otherwise detailed and precise way in which the properties of Neanderthal skeletal remains have on the whole been examined and described in such literature. Witness in this regard the recent contributions by Rendu et al. (2014) and Dibble et al. (2015) to the debate about whether the Neanderthal skeleton discovered in the bouffia Bonneval at La Chapelle-aux-Saints was deliberately buried (see Image 6.2). Futhermore, to mention just one more instance, witness the discussion in which Sandgathe et al. (2011) dispute the position that a range of authors have adopted over the years about the apparent burial of the Neanderthal infant at Roc de Marsal.[7] But let us assume for the sake of argument that inferential step B is sufficiently well warranted, and move on to inferential step D in Figure 6.1.

6.3 The Step from Deliberate Burials to Symbolic Behaviour

Starting from conclusion C in Figure 6.1 – namely that certain Neanderthals were deliberately buried – inferential step D yields conclusion E – namely that the Neanderthals who carried out the burials engaged in a form of symbolic behaviour. The latter conclusion has turned out to be controversial, threatening the soundness of inferential step D. Why it is controversial is illustrated by the debate about whether the alleged burial of the Neanderthal skeleton in the bouffia Bonneval at La Chapelle-aux-Saints was intentional and whether it was a manifestation of symbolic behaviour.

As for this debate, Rendu et al. (2014: 2) assert that their fieldwork at La Chapelle-aux-Saints has established the anthropogenic nature – human origin – of the so-called burial pit. They also hold that this work has underlined the taphonomic evidence – evidence about the processes that could have affected the skeleton after death – of a rapid burial of the Neanderthal concerned. They accordingly conclude that '[t]hese multiple lines of evidence support the hypothesis of an intentional burial'. This conclusion is in keeping with Rendu et al.'s (2014: 84) assumption that '[t]he existence of an artificially modified pit and the rapid burial of the body constitute convincing criteria for establishing purposeful burial during the Middle Paleolithic of Western Europe'.

Rendu et al. (2014: 85) go on to draw a second important conclusion about the burial at issue: it is a manifestation of symbolic behaviour by the Neanderthals who were responsible for it. So, how do these authors reason to arrive at this conclusion? In the absence of apparent carnivore modification, the rapid burial indicated by the taphonomy is, according to Rendu et al. (2014: 85), 'as one would expect in a funerary context'. Reasoning in this way is to adopt rapid burial as a criterion for a funerary context, a funerary context being one in which symbolic rituals are performed. Finally, Rendu et al. (2014: 2) draw a more general conclusion, asserting that their data about the La Chapelle-aux-Saints burial '... buttress claims for complex symbolic behavior among Western European Neandertals'.

Interesting, now, is the appraisal by Dibble et al. (2015) of Rendu et al.'s (2014) conclusions about the La Chapelle-aux-Saints burial: (a) that it was intentional and (b) that it represented symbolic behaviour by the Neanderthals concerned. This appraisal is carried out by way of a critical examination by Dibble et al. (2015) of the data and arguments offered by Rendu et al. (2014). For the purpose of their examination, Dibble et al. (2015: 650–54) adopt Sandgathe et al.'s (2011) criteria for purposeful Neanderthal burials, rephrasing these criteria as follows: 'What is the nature and origin of the 'burial pit'?'; 'Were the remains fully enclosed by the pit and at its base?'; 'Were the remains in a homogeneous and separate deposit – i.e., intentional infill?; 'Does the condition of the Neandertal skeleton indicate deliberate burial?'; 'Were the Neandertal and faunal remains differently preserved?'; 'Were there "grave goods" or other evidence suggesting ritual?'. On the basis their examination, Dibble et al. (2015: 649) conclude that 'this site [i.e., La Chapelle-aux-Saints – R.B.] fails to provide unequivocal evidence in support of the notion [i.e., Rendu et al.'s (2014) conclusions – R.B.] that Neandertals intentionally interred their dead, whether in any ritualistic or symbolic context or not'.

Important here is Dibble et al.'s reason for not accepting Rendu et al.'s conclusion that the alleged burial of the Chapelle Neanderthal represents a form of symbolic or ritualistic behaviour. Central to this reason is the distinction between a burial and a funeral. As observed by Dibble et al. (2015: 655),

whereas a burial is essentially a body covered in sediment, a funeral '... denotes a symbolic ritual perhaps based on spiritual beliefs'. The criterion for a funeral is the presence of grave goods or offerings, conventionally taken to be objects deposited along with a body for use in the afterlife. According to Chase and Dibble (1987, 1992), these objects must be unique or stand out in some manner from the background objects found at the site. Furthermore, Dibble et al. (2015: 654) observe that Rendu et al. (2014) have neglected to evaluate evidence for grave goods or ritual behaviour at La Chapelle-aux-Saints. The objects found in association with the La Chapelle skeleton were the distal limb bones of a large bovid as well as other large bone fragments. These objects were originally interpreted by Bouyssonie et al. (1908: 517) as 'offerings of food for the dead'. But, as pointed out by Dibble et al. (2015: 654), the original report states that '... these artifacts are essentially of the same type of materials found elsewhere at the site'. And they proceed to mention that in south-west France 'the occurrence of artifacts or bones in graves is almost inevitable if the graves are dug through and refilled with the occupation sediments'. In sum: Rendu et al. (2014) have not shown that the alleged burial of the La Chapelle Neanderthal was accompanied by the symbolic or ritual behaviour that is distinctive of a funeral. To show that a burial was carried out intentionally is not to show at the same time that the mortuary activities concerned represented a form of symbolic behaviour. [8]The body could have been deposed for some practical reason such as protection from scavengers or, as argued by Wynn and Coolidge (2012: 110), a corpse may be hidden '... to reduce the emotional pain of seeing a loved one decay'.

The doubts cast by Dibble et al. (2015) on the claim that the alleged burial of the La Chapelle Neanderthal represented a form of symbolic or ritual behaviour are instructive not only of the funerary status of this particular individual. These doubts generalise to all claims that attribute a symbolic component to intentional Neanderthal burials on the basis of the presence of apparent grave goods. These objects include three flints associated with La Ferassie 5, lithic items associated with Kebara KMH2, flowers associated with Shanidar IV, the red deer maxilla associated with Amud 7, and the bear tibiae associated with Le Regourdou 1. According to Pettitt (2011a: 128–29), 'most scholars would now agree that these [apparent grave goods – R.B.] are not convincing, as the objects recovered from within grave cuts never differ from those recovered from the sediments into which graves themselves were cut'. In Pettitt's (2011a: 129) opinion, grave goods may or may not relate to metaphysical notions of an afterlife or bodily extension. The objects found in graves '... probably speak more of self-expression and concepts of ownership'; and he believes it may well be that neither existed in Neanderthal societies.[9] Wynn and Coolidge (2012: 111) have, likewise, concluded that there does not appear to have been any religious or symbolic components in Neanderthal mortuary activities.

Instead, Neanderthals' treatment of corpses suggests to them 'actions to mitigate the emotional and social impact of death for the very short term'. Referring to Mellars (1996a: 381), Hovers and Belfer-Cohen (2013: 636) share the view that, on a parsimonious interpretation, Middle Palaeolithic burial practices represent 'emotional responses to death of kin'.

How, then, does the discussion above bear on the soundness of the inferential step represented as 'D' in Figure 6.1? If the presence of undisputed grave goods is a valid criterion for attributing a symbolic component to Neanderthal burials, this step lacks a warrant. That is, it cannot be soundly inferred from currently available data about Neanderthal burials that some Neanderthals engaged in a form of symbolic behaviour in burying their dead. In similar vein, Chase and Dibble (1987: 276) have concluded earlier that 'the evidence from Middle Paleolithic burials – except those of anatomically modern *H. sapiens* – does not demonstrate the presence of symbolism or of culturally defined values during that time'.

6.4 Conclusion

It is clear from the preceding sections that there are firm grounds for the widely held view that, though some Neanderthals intentionally buried their dead, these burials lacked a symbolic component. Pettitt (2011a: 266–68; 2011b:152), however, suggests that Neanderthals' treatment of the dead may have developed through different stages. Whereas originally such treatment may have involved the modification of natural caches, i.e., (hidden) places in which bodies were stored, later it involved the deliberate construction of such places. This development, Pettitt (2011a: 268) asserts, '... clearly required greater communication, underpinned by active association between the living and the dead'. Although this deliberate construction of such places may not justifiably be called fully symbolic, '... it is certainly a major step towards it', he contends. As noted in Section 3.5.1, symbolism is in the view of various scholars clearly not a 'black-and-white issue'.

Let us, in sum, return to the question of the soundness of the deliberate-burial inference depicted in Figure 6.1. Represented by arrow B, the inferential step from data about the remains of Neanderthals found at various sites to the conclusion that these Neanderthals were deliberately buried, has been accepted by many prehistorians as sound. This is not the case, though, with the inferential step represented by arrow D. That is, it is generally thought that it cannot be inferred from the fact that these Neanderthals were deliberately buried that the Neanderthals who carried out these burials behaved symbolically. The soundness of inferential step F – the one from symbolic behaviour to language – is the topic of the next chapter.

7 Leaping to Language

7.1 The Language Inference

Chapters 3–6 focused on four symbolic behaviours that have been attributed to some Neanderthals: making and wearing personal ornaments, beautifying their bodies, producing cave art. and burying their dead. The question, now, is whether it is possible to soundly infer from these behaviours that Neanderthals had language and, if they did, about what it was like. The present chapter, that is, is about the soundness of what may be called 'the language inference'. This is the inference represented schematically by EFG in Figures 3.1, 4.1, 4.2, 4.3, 5.1 and 6.1, and which I represent schematically here as Figure 7.1.

To be sound within the framework of the Windows Approach, the language inference needs to meet the fundamental conditions of pertinence, groundedness and warrantedness invoked in preceding chapters. Stated as questions, these conditions read as follows:

Three Fundamental Conditions to be Met by the Language Inference

(a) Is the entity – language – central to its conclusion, G, characterised in a clear, non-ad hoc way? (The Pertinence Condition)
(b) Do the phenomena from which inferential step F starts – forms of symbolic behaviour – provide adequate grounding for it? (The Groundedness Condition)
(c) Is inferential step F – from forms of symbolic behaviour to language – warranted? (The Warrantedness Condition)

I will consider questions (a), (b) and (c) in respectively Sections 7.2, 7.3 and 7.4, Section 7.5 being a concluding one.

7.2 The Many Guises of Neanderthal Language

Over the years, scholars of diverse disciplinary orientations have attributed language in one or another guise to Neanderthals, claiming amongst others that it was:

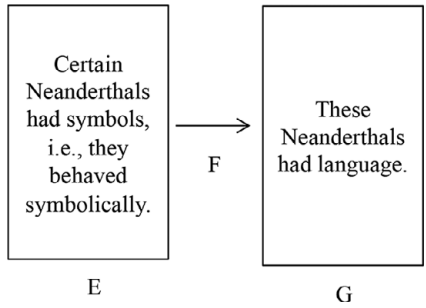


Figure 7.1 The language inference

(a) *Something much like fully modern language, e.g.:*

> Neanderthals shared with us something like modern … language. (Dediu and Levinson 2013: 1)[1]
>
> Thus we attribute to Neanderthals modern speech, double articulation (separated phonology and lexicon), some systematic means of word combination (syntax), a correlated mapping to meaning, and usage principles (pragmatics). (Dediu and Levinson 2013: 2)
>
> we think it is overwhelmingly likely that Neanderthals were as much articulate beings as we ourselves are, that is, with large vocabularies and combinatorial structures that allowed propositional content and illocutionary force to be conveyed. (Dediu and Levinson 2018: 52)
>
> European Neandertals had linguistic capacities similar to living humans. (Frayer et al. 2010: 113)
>
> human language ability, it was present not only in modern humans but also in late Neandertals. (Krause et al. 2007: 1911)

(b) *Something more limited than modern language:*

> if they [i.e., Neanderthals – R.B.] had language, it could not have been fully modern language … (Gamble et al. 2014: 147)
>
> Neanderthals may have had a form of language that lacked some of the features of modern human language. (Johansson 2013a: 40)
>
> some language abilities, if not necessarily full modern syntactic language, were present in Neanderthals. (Johansson 2015: 311)
>
> In our opinion, current evidence supports [the view – R.B.] that Neanderthal language was not like AMH's [Anatomically Modern Humans' – R.B.] because it lacked *modern* syntax (and *only* because of this). (Barceló-Coblijn and Benítez-Burraco 2013: 199–200)

Neandertals … did not command hierarchical transitive syntax, but most probably "only" the basic, paratactic, two-slot platform … Neandertals would have, in that case, inherited this paratactic grammar but could not have inherited hierarchical grammar from *H. heidelbergensis*. (Progovac 2016: 11) [2]

(c) *Something called 'speech', 'a form of speech', 'spoken language', 'communication', 'a verbal medium of communication', 'a form of communication', etc.:*

Neanderthals shared with us something like modern speech. (Dediu and Levinson (2013: 1)

we grant them [i.e., Neanderthals – R.B.] either sign language or some phonologically limited form of speech. (Barnard 2011: 94)

Neanderthals must have possessed speech and language, though their vocal tracts precluded their mastering any human dialect [24]. (Lieberman 2015: 2)

Neandertals may have had some form of verbal communication that conveyed factual knowledge at least. (Wynn and Coolidge 2012: 128)

Neandertals had speech … Neandertal speech was probably based on a large (perhaps huge) vocabulary: words for places, routes, techniques, individuals, and emotions. (Wynn and Coolidge 2012: 131)

Many of these words existed in stock sayings … much like the idioms and adages in modern language. (Wynn and Coolidge 2012: 131)

Neandertal speech regularly used questions, commands, exclamations, and perhaps directional reference (indicatives). The difference may have been marked with "aspect" words, or morphological rules, or even grammatical rules. (Wynn and Coolidge 2012: 132)

It [i.e., Neanderthal speech – R.B.] may have included features quite foreign to modern language that evolved in the Neandertal lineage since the time of *Homo heidelbergensis*. (Wynn and Coolidge 2012: 132)

Thus we must conclude that Neandertal communication evolved along its own path, and that this path may have been quite different from the one followed by our ancestors. The result must have been a difference far greater than the difference between Chinese and English, or indeed between any pair of human languages. (Wynn and Coolidge 2012: 130)

the Neanderthals may have been able to produce a range of sounds to form speech of great complexity. (Papagianni and Morse 2015: 115)

Neanderthals almost certainly had spoken language, although it is debatable whether their speech was as complex as ours. (Papagianni and Morse 2015: 194)

We hypothesize that the Schöningen hominins [i.e., late *Homo heidelbergensis* and early Neanderthals – R.B.] likely had still more sophisticated language skills, likely

> including vocal communication with the ability to convey information about the past, present and future as well as spatial relationships beyond those of their immediate surroundings. (Conard et al. 2015: 13)

> While much of the communication would have been concrete and would not have necessitated complex syntax, concepts related to the past and future and distant places would be facilitated by spoken language and vocal and verbal formulations reflecting an array of nouns, verbs, prepositions and descriptive terms. (Conard et al. 2015: 13)

These claims about the alleged linguistic attributes of Neanderthals are by no means unique: the literature contains many more similar ones. Though limited in number, the quoted claims are instructive in various ways, two of which are particularly relevant here. The first is about the nature and distinctive properties of the linguistic entities referred to as 'language', 'human language ability', 'linguistic capacities similar to living humans', 'speech', 'a form of speech', 'something like modern speech', 'spoken language', 'a verbal medium of communication', 'a form of communication', 'some form of verbal communication', 'more sophisticated language skills', and so on. These linguistic entities are on the whole not explicitly characterised within the framework of a principled linguistic ontology.[3] Which means that it is not clear what their distinctive properties are and, accordingly, whether they represent the same or different linguistic entities. Consider, for instance, the expressions 'language ability', 'linguistic capacities', 'and language skills' as they are used in the claims quoted above. Do these expressions refer to one and the same linguistic entity? If so, what are its distinctive properties? If not, how do the various linguistic entities differ from one another? And how do these entities relate to the entities called 'language' and 'speech'? In the absence of principled answers to questions such as these, it is not clear exactly what linguistic entities are attributed to Neanderthals. With the consequence that it is not clear what is required in the way of grounds (evidence) and warrants for justifying the claims concerned. This, in turn, means that these claims lack empirical content. Particularly troublesome in this regard is the conflation of language, speech and communication. These entities belong to different linguistic domains: if well-defined, language to that of cognition; speech to that of linguistic behaviour; and communication to that of linguistic function. As is clear from some of the claims quoted above, though, these distinctions are not drawn by all authors.[4] To mention just one more consequence of the obscure nature of the linguistic entities attributed by many authors to Neanderthals: due to this obscurity, it is unclear whether authors agree or disagree with one another about what the linguistic attributes of Neanderthals were.

The claims about Neanderthal language quoted above are instructive in a second way as well: it concerns the identity of the people who are supposed to

have the linguistic attributes concerned. In the case of the majority of these claims – and in that of many similar other ones in the literature – the term 'Neandert(h)als' is used in the generalised sense of 'all Neandert(h)als'. That is, these claims fail to distinguish explicitly between different groups or populations of Neanderthals. For instance, between Neanderthals who lived during different *periods* of the roughly 400,000-year existence of the species, including earlier and later Neanderthals (but see as an exception the quotation from Conard et al. (2015: 13)); between Neanderthals who inhabited different *regions* of Eurasia; between Neanderthals who lived in the same region but who occupied different *caves or shelters* (but see as exceptions the quotations from Conard et al. (2015: 13) and Frayer et al. (2010: 113)); between Neanderthals who differed with respect to the putative *behaviours* in which they engaged, and the *artefacts* resulting from some of these behaviours;[5] and between Neanderthals who co-existed and culturally and biologically interacted *with modern humans*, and Neanderthals who did not.

In sum, claims attributing linguistic entities such as those concerned to Neanderthals are on the whole problematic in one of two ways. Such claims fail the Pertinence Condition: it is not clear to which Neanderthals the linguistic entities concerned – language, speech, etc. – are attributed. Recall in this regard the warning given in Section 2.5 not to simply assume that all Neanderthals had the same capacities and engaged in the same behaviours. Furthermore, as noted in Section 6.1, in similar vein is Pettitt's (2011a: 136) warning against treating Neanderthals from a behavioural perspective as one monolithic archaic species. Alternatively, if the expression 'Neandert(h)als' is used in the claims at issue in the sense of 'all Neandert(h)als', then they express unjustified generalisations, claiming more than is permitted by the limited evidence.

7.3 A Flimsy Foundation

As shown in Chapters 3–6, step F is grounded in prior conclusions in terms of which some Neanderthals engaged in one or another form of symbolic behaviour: making and wearing personal ornaments, beautifying their bodies, producing cave art and burying their dead. This gives rise to the question, 'Does what we reliably know about these forms of Neanderthal behaviour provide adequate grounding for step F?' For the answer to this question, we have to go back to the main findings of Chapters 3–6. I first list these findings below and then consider their significance.

Main Findings about the Personal-Ornament Inference (Chapter 3)

(a) Some Neanderthals were in all likelihood associated with material objects such as ivory rings, marine shells, raptor talons, animal teeth and the like.

(b) These objects were in all likelihood worn by these Neanderthals as personal ornaments.
(c) Whether these personal ornaments were used by these Neanderthals as symbols – as opposed to one or another non-symbolic purpose – cannot be confidently inferred.
(d) The purpose/purposes for which Neanderthals used these ornaments is/are still to be investigated within the framework of an appropriately enriched conceptual framework that includes, amongst other things, an adequate general theory of symbolism.

Main Findings about the Hashtag-Engraving Inference (Chapter 4)

(a) There are concerns about the accuracy of the dating of the hashtag pattern engraved in a wall of Gorham's Cave.
(b) Associated with these, there are doubts about whether the hashtag engraving was made by a Neanderthal rather than by a modern human.
(c) It is unclear whether this engraving had a meaning and, if it did, what this meaning was.
(d) It cannot be inferred with sufficient confidence from the engraving in Gorham's Cave that its Neanderthal inhabitants engaged in symbolic behaviour.

Main Findings about the Red-Disks-and-Hand-Stencils Inference (Chapter 4)

(a) The dating of the red disks and hand stencils on walls of El Castillo Cave leaves it unclear whether the marks concerned were made by Neanderthals or by modern humans.
(b) It is not clear whether these disks and stencils had a meaning and, if they did, what this meaning was.
(c) It is impossible to infer from these disks and stencils that the Neanderthals who occupied El Castillo Cave behaved symbolically.

Main Findings about the Iberian-Caves Inference (Chapter 4)

(a) Though the dates obtained for the paintings (hand stencils) found in these caves are questioned, it is possible that these marks were made by Neanderthals.
(b) No empirical evidence has been provided for attributing symbolic status to this activity; it has rather been stipulated that it constitutes symbolic behaviour by definition.
(c) The notion of a 'meaningful place' that has been invoked to assign meaning to some of the stencils concerned is both obscure and unconstrained.

Main findings about the Body-Decoration Inference (Chapter 5)

(a) Blocks of manganese dioxide were indeed associated with some Neanderthals.

(b) There are genuine doubts whether the Neanderthals concerned used pigment for the purpose of decorating their bodies as opposed to one or more non-decorative purposes.
(c) It is accordingly impossible to infer with any confidence that these Neanderthals engaged in symbolic behaviour in using such pigment.

Main Findings about the Deliberate-Burial Inference (Chapter 6)
(a) The Neanderthals who inhabited various caves did, in all likelihood, intentionally bury some of their dead.
(b) Undisputed grave goods have not been found in association with the buried skeletal remains.
(c) These burials accordingly do not represent funerals and, so, it cannot be confidently inferred that, in carrying them out, the Neanderthals concerned engaged in a form of symbolic behaviour.

Given these findings, it is not possible to conclude with any confidence that Neanderthals' alleged production of cave art, their use of pigment and their burial of the dead represent forms of symbolic behaviour. This means that these three alleged forms of symbolic behaviour cannot provide the necessary empirical grounding for inferential step F, which reflects negatively on the soundness of the language inference.

In the case of Neanderthals' making and wearing of personal ornaments, the picture is slightly different. Their doing this could still be shown to have represented a form of symbolic behaviour. But this would require new work. For, as has been argued in Section 3.5.2, it has been arbitrarily stipulated within the conceptually impoverished Received Framework that the making and wearing of personal ornaments by some Neanderthals constituted a form of symbolic behaviour. And this stipulation cannot provide the empirical grounding needed by step F. The Received Framework may, however, be abandoned in favour of an enriched semiotic framework, exemplified in Section 3.5.1 by the Basic Framework and the Extended Framework. This would allow Neanderthals' use of personal ornaments to be re-examined, with the possibility of arriving at a credible conclusion that these humans did use objects such as sea shells, raptor talons, animal teeth and ivory rings for a symbolic purpose. A conclusion to this effect would provide the needed empirical grounding for inferential step F as a core component of the language inference.

7.4 A Bridge Too Far

Let us assume for the sake of argument that in making and wearing personal ornaments, producing cave art, decorating their bodies and burying the dead some Neanderthals did behave symbolically. The question, then,

is: 'Why is it permissible to infer from these behaviours that the Neanderthals concerned had language?' In other words: 'What is the warrant licensing inferential step F, the step from symbolic behaviour to language?' To see what these questions are about, notice that scholars claiming that Neanderthals had language assume, often without saying it in so many words, that Neanderthal language had a particular property: it was symbolic. The most outspoken advocates of the view that Neanderthals had symbolic language are the prehistorians whose views are discussed in Chapters 3–6, Francesco d'Errico, João Zilhão and their research associates being prominent among them.[6]

To give substance to the claim that Neanderthal language was symbolic, it is necessary to clarify the nature of the symbols used by it. This, however, has not been done by those who use step F in Figure 7.1 to infer that Neanderthal language was symbolic. To give the desired clarification, the difference between cultural symbols and linguistic signs needs to be taken into account. Linguistic signs are conventionally taken to be composite units that have three components: (i) an overt signal – the 'signifier'; (ii) the information evoked in the form of a concept by the signal, the 'signified' or 'meaning'; and (iii) a relation, primarily arbitrary, between the signifier and the signified.[7] Linguistic signs differ in a fundamental way from cultural symbols. This difference is lucidly illustrated by Balari et al. (2011: 8) with the aid of the words (linguistic signs) 'dog', 'unicorn', 'brown', and 'green'. Speakers of English who know these words automatically know the meanings of the combinations 'brown dog', 'brown unicorn', 'green dog', and 'green unicorn'. They know the latter three meanings even if they lack familiarity with the situations in which the words concerned may be appropriately used. The meanings of these words are in this sense transparent (which is not to say that they are related in a non-arbitrary way to their respective forms). Cultural symbols differ in this respect: their meanings are opaque. That is, as Balari et al. put it:

> the meanings of elements making up a Symbolic Culture are opaque until we enter in contact with that Symbolic Culture (to participate in/observe/be informed of the practices in which these elements become meaningful); nothing of this sort applies to the meanings of linguistic complex expressions. These we naturally grasp as we hear them, even with no prior exposition and in the absence of corresponding entities or situations'. (Balari et al. 2011: 8)

Assuming that the artefacts – beads, raptor talons, hand stencils, engravings and the like discussed in Chapters 3–6 – were treated as cultural symbols by some Neanderthals, it is difficult to imagine how Neanderthal language could have used symbols of this sort. Specifically, how such cultural symbols could

have been combined by Neanderthals to form meaningful sequences of symbols. For cultural symbols such as these clearly lack the property of semantic combinability that characterises linguistic signs such as 'brown', 'green', 'dog', and 'unicorn'. It is more easily conceivable that Neanderthal language used symbols akin to modern linguistic signs. Suppose, for instance, that Neanderthal language included signs corresponding to the English words 'big', 'mammoth', and 'kill'. And suppose, moreover, that this language had a simple syntax, say one that is similar to the linear two-word grammar provided for by Jackendoff and Wittenberg (2014: 67ff., 2017: 221).[8] Using this syntax, Neanderthals would have been able to juxtapose the signs concerned to form sequences such as 'big mammoth', 'kill mammoth' and 'mammoth kill'.

But how does the distinction between linguistic signs and cultural symbols bear on the soundness of the language inference? Inferential step F starts from the conclusion that some Neanderthals behaved symbolically, i.e., that they had cultural symbols that lacked semantic combinability. And F ends with the conclusion that they had symbolic language, i.e., language using linguistic signs characterised by semantic combinability. The question, then, is 'By what warrant is inferential step F licensed?'. That is, 'What is the inferential bridge leading from cultural symbols to linguistic signs?' The required warrant is not stated explicitly in the literature. It should roughly assert the following: 'If the culture of people includes semantically non-combinable symbols, then they will have a language that uses semantically combinable linguistic signs.' But why should this warrant be in order? That is, 'By what bridge theory is F underpinned – a theory specifying the ways in which semantically non-combinable cultural symbols and semantically combinable linguistic signs are interlinked?' In the absence of the required warrant and bridge theory, F represents an arbitrary inferential leap.

The distinction between linguistic signs and cultural symbols ties in with a distinction drawn by Philip Chase (1999: 34): that between symbolism as reference and symbolism as culture. According to him, symbolism as reference is the 'use in language and elsewhere of arbitrary (i.e., conventional) signs to refer to things or concepts'. Symbolism as culture or symbolic culture is characterised by Chase as:

> the extension of symbolism beyond reference to the creation of an intellectual environment populated by phenomena that owe their very existence to symbolism and where every thing and every action has significance in an all-encompassing symbol system. (Chase 1999: 34)

As regards the evolutionary link between symbolic reference and symbolic culture, Chase (1999: 34) is of the opinion that we cannot assume that '. . . they

appeared simultaneously in the course of human evolution'. He elaborates on this by remarking that:

> it would be highly detrimental to the cause of investigating such questions if one were to simply *assume* that symbolic reference and symbolic culture must have evolved or appeared together in the Pleistocene, just because they are closely associated today. (Chase 1999: 45)

In a later publication, Chase (2006) tellingly points out that:

> [m]ost archaeologists (including myself prior to 1999) have made no distinction between referential symbolism and elaborated, all-encompassing symbolic cultural systems. As a result, we have assumed that the archaeological evidence for symbolism tracks the use of symbols (including the earliest referential symbols) rather than the elaboration of culture. (Chase 2006: 121)

7.5 Conclusion

What, then, can be concluded on the basis of the considerations set out above in Sections 7.2–7.4 about the soundness of the language inference? That there are serious doubts about it, including the following:

Doubts about the Soundness of the Language Inference

(a) The conclusion, G, that some Neanderthals had language is not sufficiently pertinent. That is, the entity central to this conclusion – Neanderthal language – is on the whole not clearly identified and adequately distinguished from other entities populating the linguistic realm.
(b) The grounding of inferential step F in the conclusion E is contentious. That is, it has not been uncontroversially established that the Neanderthals at issue did engage in the forms of symbolic behaviour that are to provide the empirical grounds for F.
(c) Inferential step F lacks an appropriate warrant. That is, the step – which moves inferentially from semantically non-combinable cultural symbols to semantically combinable linguistic signs – lacks a warrant underpinned by an appropriate bridge theory.

This brings me to the question of what can be done about these doubts, assuming that they are genuine. The first doubt can be readily addressed by refraining from identifying and characterising Neanderthal language in an ad hoc way with the aid of obscure linguistic concepts. The cure lies in adopting a linguistic ontology that draws principled distinctions between linguistic entities such as those denoted by the terms 'language', 'modern language', 'rudimentary language', 'language ability', 'capacity for language', 'language/linguistic skill', 'speech', 'spoken language', 'verbal communication' and the

like. At its core, such an ontology has a concept of 'language' that needs to satisfy a number of basic conditions in order to be useful in empirical inquiry. Central to these conditions are the following three (Botha 2016: 22):

Conditions on a Concept of 'Language'

(a) The concept must be needed for giving a systematic account of a body of linguistic facts, including facts about structure, acquisition, variation, change, contact, loss/death, pathology, behaviour, diversification etc.
(b) The concept must provide a good basis for interlinking language with other linguistic entities – capacities, processes, behaviours etc.
(c) The concept must make it possible to give an account of how language is interrelated with non-linguistic entities of a cognitive sort, a perceptual sort, a neurological sort, a cultural sort etc.

Turning to the second doubt about the soundness of the language inference, future work may provide support for the view that Neanderthals' making and wearing of personal ornaments represented a form of symbolic behaviour. That is, if such work is done within an enriched conceptual framework, instances of which are outlined in Section 3.5.1. Such work could provide empirical grounding for inferential step F. This expectation, however, may be judged overly optimistic by some. Thus, Marc Kissel and Agustín Fuentes (2017: 397) maintain that 'for the Pleistocene, and in particular for the suite of artefacts suggested to be of symbolic relevance in human evolution, understanding what these objects meant to their creators is a seemingly hopeless objective'. By this, they imply that in the case of Neanderthal personal ornaments, it seems impossible to determine whether these objects were treated as symbols by those who made and wore them.

To address the third doubt about the soundness of the language inference, two steps need to be taken. The first would involve the adoption of an approach to the logic of inquiry that requires inferential steps to be underpinned in an explicit way by warrants that are derived from adequate bridge theories. The second step would involve providing an appropriate warrant and a bridge theory to permit the inferential move from semantically non-combinable cultural symbols to semantically combinable linguistic signs. Doing this may be highly challenging too. Thus, according to Philip Chase (1999: 47), evidence for the origins of language as a purely referential phenomenon may be unobtainable from the archaeological record.

Left unaddressed, the doubts (a)–(c) undermine the soundness of the language inference. This implies that at present it is not possible to infer from the symbolic behaviours in which some Neanderthals allegedly engaged that they had symbolic language, i.e., language that uses linguistic signs. This does not

imply, however, that these Neanderthals did not have language and that this language was not symbolic in the latter sense. It may be possible to infer from some of the non-symbolic forms of behaviour in which Neanderthals are claimed to have engaged that they had language, and, moreover, that their language used linguistic signs. Possibilities to be pursued in Part III of this book.

Part III

Non-symbolic Behaviours

As noted in Chapter 1, recent accounts portray Neanderthals as people who engaged in a range of non-symbolic behaviours that are judged to be similar or comparable to those of their modern or near-modern human contemporaries. Thus, it has been maintained that there were Neanderthals who:

- cooperated to successfully hunt big game such as reindeer, horse, bison, aurochs, woolly mammoth and woolly rhinoceros (Conard et al. 2015: 5; Harvati 2015: 2258–59; Roebroeks and Soressi 2016: 6374; Roebroeks and Verpoorte 2009:154; Straus 2009: 9; Wynn and Coolidge 2012: 44);
- made carefully designed wooden throwing-spears and other wooden tools, many of which were found at the Palaeolithic site of Schöningen near Hannover in north-central Germany (Conard 2015: 2473; Conard et al. 2015: 4; Harvati 2015: 2258; Thieme 1997: 807ff.)[1]
- used some 'modern' methods to make stone tools such as small blades (Soressi 2005: 389, 408–09; Straus 2009: 7) as well as specialised bone tools such as *lissoir* for softening and toughening animal hides (Soressi et al. 2013: 14186, 14188; Straus 2009:7);
- used the sites where they lived in ordered and structured ways, the Kebara Cave in Israel being cited as an instance (Speth 2007: 183);
- used fire in a controlled way in a chemical process for producing pitch from birch bark to glue handles onto their stone tools and also flint stone blades onto wooden shafts (Cârciumaru et al. 2012: 1950; Gowlett 2016: 4, 5; Grünberg 2002: 15–16; Johann et al. 2001: 385, 392–93; Koller and Mania 2001: 385, 393–94; Mazza et al. 2006: 1310–11; Roebroeks and Soressi 2016: 6375; Roebroeks and Villa 2011: 5212; Straus 2009: 8–9; Villa and Soriano 2010: 7; Zilhão 2011: 119);
- made waterproof clothing and footwear from hides that they had tanned in order to survive the harsh winter temperatures of the Ice Age in central Europe (Aiello and Wheeler 2003; Meller 2003; Sorensen 2009: 2201, 2204; Wales 2012: 793–94; Zilhão 2011: 118);
- gave extensive medical treatment and health care to injured, impaired, sick and infirm individuals such as those referred to as 'LCS1' and 'LF1' whose remains were recovered at La Chapelle-aux-Saints and La Ferassie 1 in south-west France respectively (Spikins et al. 2018: 5–11; Tilley 2015: 219–57);

- used medicinal herbs such as yarrow and chamomile, for instance Neanderthals who inhabited El Sidrón Cave in northern Spain (Hardy et al. 2012: 623–24; Weyrich et al. 2017: 359).

Some of these non-symbolic behaviours have been taken to shed light on the question of whether Neanderthals had language and, if they did, what their language was like. Considered especially important, in this regard, are inferences that have been drawn from Neanderthals' making of stone tools, and their teaching/learning how to do this. Accordingly, I examine what may be called the 'knapping inference' (Chapter 8) and the 'knapping-pedagogy inference' (Chapter 9). To conclude Part III, I turn to another potentially instructive non-symbolic behaviour from which inferences have been drawn about Neanderthal language: Neanderthals' cooperative hunting of big game, data about which forms the basis of what may be called the 'hunting inference' (Chapter 10). I examine these three inferences from non-symbolic behaviours in order to determine how they are structured, to get an idea of how sound they are and to assess their potential as windows on Neanderthal language.

8 Making Stone Tools

8.1 Connecting Stone Tools via Knapping to Language

For much of prehistory, Iain Davidson (2010b: 185) observes, 'the evidence of the making, use and abandonment of stone tools is not only the most abundant but also the best evidence of the evolution of human behaviour'. This view echoes the earlier pronouncement by Tom Wynn (1999: 263) that '[t]ools are also the most abundant evidence we have of human evolution'. To this Mark Moore and Yinika Preston (2016: 1) have added that '[s]tone-flaking technology is the most enduring evidence for the underlying cognitive abilities of our early ancestors'. This evidence, it has been claimed by various scholars over the years, sheds light on the emergence of human language.[1] In three important publications, Wynn (1993, 1995, 1999) critically discusses a number of earlier accounts claiming there to be connections, similarities, analogies and the like between stone tools and what is loosely referred to as 'language'. Made in what he refers to as a 'curious literature', these putative connections include the following:

Putative Connections between Stone Tools and Language

(a) The mere existence of stone tools informs us about language. (Wynn 1999: 269)
(b) Tool manufacture and language are both tied to cortical asymmetry, i.e., they overlap neurologically. (Wynn 1993: 391)
(c) The respective actions involved in stone-tool making and in language use yield sequences that are organised in a similar way. (Wynn 1993: 389)
(d) Language may affect how tool-use and tool-making are learned. (Wynn 1993: 389)[2]

Having argued in some detail why stone tools and language are not connected in these ways, Wynn (1999: 284) concludes that '[t]ools tell us little about language'. The question is whether Wynn's judgement that 'tools tell us little about language' applies to modern versions of accounts postulating evolutionary connections between stone tools and language, and specifically whether sound inferences about Neanderthal language can be drawn from the

ways in which these humans are believed to have made stone tools and how they learned to do this. That is, I will be looking at modern versions of the putative connections (c) and (d). As a run-up to this, let us consider Wynn's account of why earlier attempts at inferentially connecting stone tools and language as in (c) failed.

8.2 A Dubious Old Connection

To make a stone tool such as a chopper, a scraper or a blade, a stone (a 'core') is struck with a hammer of stone, bone or hard wood to yield a flake with one or more sharp edges.[3] 'Fracturing stones yields sharp edges' is, according to Wynn (1999: 265), 'the basic principle of almost all stone-age technology'. The sequential actions performed to produce stone tools are jointly known as '(stone-)knapping', which, as Wynn (1999: 266) puts it, is '... a subtractive task; one removes material to achieve a result'.

Consisting of sequential motor actions, Wynn (1993: 392) observes, tool behaviour is similar to speech, which 'also consists of elements strung together in utterances'. Switching from 'speech' to 'language',[4] he continues: 'The sequential nature of tool behaviour and language tempts us, quite reasonably, to suppose that the respective sequences are constructed in the same way or at least in similar ways' (Wynn 1993: 392).[5] This supposition is central to early accounts that postulated an evolutionary link between tool making and 'language', inferring from sequential tool-making actions of non-modern hominins that they had 'language'. This inference is unsound, though, failing to satisfy a fundamental condition adopted by Wynn. It may be called 'The Critical Feature Condition' and reads as follows:

The Critical Feature Condition
Only if tool behaviour and language use the *same* critical features can we use the first as evidence for the second. (Wynn 1993: 389)

This condition entails, Wynn elaborates, that similarity alone is insufficient; it needs to be shown that similarity results from a common source.

Applying this condition, Wynn (1993: 392–93.) argues that tool behaviour '... is rather different from language in the way it constructs sequences'. Unlike the sequences of speech, the tool-making sequences do not have hierarchical structure: tool-making sequences consist of actions organised like strings of beads.[6] The central cognitive principle in terms of which such sequences are constructed, Wynn (1993: 396) asserts, '... appears to be stringing actions together by perception of contiguity'. Furthermore, to him, '[t]his kind of thinking bears only a superficial resemblance to syntax [in terms of which linguistic utterances are organised – R.B.]'.[7] Tying in with this, is Wynn's (1995: 18) view of how handaxes were made. There may well have

been rules for doing this, he believes, but 'these rules were unlike the rules of modern grammar'.[8] Accordingly, he finds that the rules for making handaxes '. . . provide no evidence, one way or the other, for the linguistic competence of these early hominids'.[9]

8.3 The Knapping Inference

A modern version of the connection between stone tools and 'language' stated as (c) in Section 8.1 is set out in a number of papers by Dietrich Stout and several co-authors.[10] Recall that in terms of (c), the actions involved in making stone tools and the actions involved in using language form sequences that are organised in a similar way. Based on more recent work, the modern version of (c) claims in essence the following about the way in which stone tools and 'language' are connected:

Stone-Tool Knapping and Language Processing (Modern Version)
The processing of language and the knapping of Palaeolithic stone tools by modern humans are structured in terms of similar hierarchies and recursion. (Stout and Chaminade 2009: 85, 92, 2012: 82; Stout et al. 2008: 1939)

So, how is this modern version of the connection under discussion brought to bear on Neanderthal language? With the aid of a composite inference, the two basic steps of which are represented by the arrows B and D in Figure 8.1.

This inference looks quite simple at a surface level; its complexity lies at a deeper level, that of the of assumptions needed for warranting the inferential steps represented by the arrows B and D. In addition, the claim representing the data in box A is contentious. So, let us consider these issues.

As for the data in box A in Figure 8.1, they represent empirical data obtained by means of experiments in which Palaeolithic stone tools were knapped by modern humans (Stout et al. 2008: 1941). These tools are Oldowan-style stone

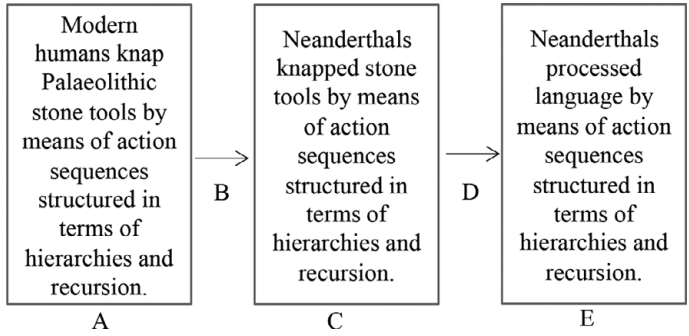


Figure 8.1 The knapping inference[11]

flakes and typical Late Acheulean handaxes, the knappers having been professional archaeologists with ten years' experience of stone-tool making and already familiar with the two technologies involved. I return later to the contentious nature of the claim expressed in A about the structure of the action sequences of these modern knappers.

Turning to the inferential step represented by arrow B, the obvious question is 'How is it possible to draw an inference about the tool-making behaviour of Neanderthals from that of modern humans?' It is achieved by analogical reasoning, as Stout and Khreisheh (2015: 868) observe. Correctly, they further note that their analogical inference needs to be justified. What, then, should this justification involve in general terms? As explained by Bartha (2013: 6–8), an analogy comprises two domains: a source or object (domain) and a target (domain). The source is a set of one or more objects, properties, relations or functions; the target is likewise a set of one or more objects, properties, relations or functions. In an analogical argument or inference, one or more properties, relations or functions of the source are 'projected' onto the target. For the projection to be successful, there need to be relevant similarities between the source and the target. As observed by Mary Hesse (1963: 91), there should not be essential differences between the two domains. For later reference, the latter requirement may be stated as:

The No Essential Difference Requirement
There should not be essential differences between properties of objects in the source and target.[12]

This requirement applies also to analogical inferences drawn by prehistorians about early hominid cognition from that of modern human species. Thus, Nicholas Toth and Kathy Schick (1993: 346) caution that 'the accuracy of such inferences from the evidence at hand is largely dependent upon one factor: how closely the extinct forms resemble modern analogs which can be carefully analyzed from a comparative perspective'. In their view, 'modern analogs are not that good' for early hominids that lived in the late Pliocene and early Pleistocene. This reflects, amongst other things, the fact that modern human species are themselves the products of a long period of 'evolution along unique trajectories and of a myriad of selective processes'.

In the case of Stout and Khreisheh's (2015) analogical inference, properties of the knapping behaviour of modern humans are projected onto the knapping behaviour of Neanderthals, the projected properties being those of hierarchical and recursive organisation of action sequences. It is not clear what similarities between modern humans and Palaeolithic hominins allow the projection of hierarchicality and recursion from the knapping behaviour of modern humans onto that of Palaeolithic hominins. But let us assume that there are such properties. The question, then, is whether there are any essential differences

between modern humans and Neanderthals that would disallow this projection. This is to ask whether Stout and Khreisheh's analogical argument satisfies The No Essential Difference Requirement. They (2015: 868) are clearly cognisant of this requirement, asserting that '[n]o experiment [conducted in actualistic research – R.B.] will ever be a perfect 'replication' of the past and so the aim is to identify and manipulate particular variables relevant to the question at hand'. Stout and Khreisheh, accordingly, discuss the way in which three differences between stone-tool knapping by modern archaeologists and stone-tool knapping by Palaeolithic hominins may bear negatively on their analogical argument, thereby jeopardising the soundness of inferential step B in the knapping inference reconstructed in Figure 8.1. These are (i) the difference between the raw materials used by modern knappers and those used by Palaeolithic knappers in making Oldowan tools; (ii) the difference between the tool-making techniques of experimental, archaeological knappers and those used by Palaeolitic knappers; and (iii) the difference between the brains and cognition of modern human knappers and those of Lower Palaeolithic knappers. Stout and Khreisheh's discussion of these three differences, however, is less than adequate, representing a significant lacuna in the justification of their analogical inference.

So, wherein lies this lacuna? It is clear from Wynn et al.'s (2016: 203–06) discussion of a range of differences between the brains and cognition of Anatomically Modern Humans (AMH) and those of Neanderthals. Pertinent here, are differences in neuroanatomy. According to Wynn et al.:

> The most demonstrable in the neuroanatomy of the two human types are found in the relative size of certain gross anatomical structures. AMH had relatively larger parietal lobes (Bruner, 2004; Bruner et al. 2003), larger temporal lobe poles (Hublin et al. 2015), wider orbitofrontal cortex (Bastir et al. 2008), larger olfactory bulbs (Bastir et al. 2011), larger cerebellums (Weaver, 2005; Hublin et al. 2015), and relatively smaller occipital lobes than Neandertals (Pearce et al. 2013). (Wynn et al. 2016: 203)

Some of these differences in brain structures 'underlie' or 'implicate' the language of Anatomically Modern Humans. For instance:

- *Anatomically Modern Humans had larger frontal and temporal poles than Neanderthals.* This difference is important in that greater asymmetry in frontal and temporal poles '... is indicative of lateralization, the functional division of labor between the two cerebral hemispheres that informs and underlies computationally expensive processes such as language' (Wynn et al. 2016: 205).
- *Anatomically Modern Humans had a wider orbitofrontal cortex than Neanderthals.* The orbitofrontal prefrontal cortex '... is the critical area for essential language functioning' (Wynn et al. 2016: 205).

- *Anatomically Modern Humans had a proportionally larger cerebellum than Neanderthals.* The cerebellum has been associated with '. . . motor learning, fine motor control, and motoric action sequencing' (Wynn et al. 2016: 206). Both stone-tool knapping and language processing involve motoric action sequencing, which makes this difference indirectly relevant here.
- *The occipital lobes of Neanderthals were larger than those of Anatomically Modern Humans.* The significance of this difference is that '[i]ncreased occipital volume . . . suggests a concomitant decrease in the relative volume of the other lobes, implying attendant differences in their cognitive functionality' (Wynn et al. 2016: 206). These other lobes obviously include those implicated in language, making also the difference at issue relevant.[13]

In sum: given these differences, it is not evident that Stout and Khreisheh's analogical argument satisfies The No Essential Difference Requirement, casting a serious doubt on the soundness of inferential step B. It cannot be simply assumed that the brains of Neanderthals and those of Anatomically Modern Humans – who, notably, are intellectually highly developed modern scholars in the case of Stout et al.'s knapping experiments – do not differ in essential ways in regard to anatomical structure and cognitive functioning. To make such an assumption would be to engage in a discredited form of uniformitarian thinking.[14]

Consider next the inferential step represented by arrow D in Figure 8.1: starting from conclusion, C, that Neanderthals' knapping of stone tools was structured in terms of hierarchicality and recursion, it ends with the further conclusion, E, that they processed language by means of action sequences structured in terms of hierarchies and recursion. So, the question is 'By what is step D warranted?'. This warrant is not stated as such by Stout and his co-authors. Stout and Chaminade (2009: 85), however, subscribe to the so-called technological hypothesis of language origins which asserts that 'language and tool-making evolved together in a mutually reinforcing way', and this hypothesis probably forms part of the required warrant. Stout (2010: 159) discusses at considerable length three possible types of co-evolutionary interaction between complex tool-use and 'language'. These involve shared neural substrates, shared social context and shared reliance on general information-processing capacities. With reference to the latter type of evolutionary interaction, Stout states that:

> growing appreciation of the importance of hierarchical cognition – not simply in language but across domains of human action – is consistent with shared reliance on general information processing capacities. (Stout 2010: 159)

This putative evolutionary connection between tool making and 'language' implies the following at the level of these shared capacities: if Palaeolithic humans such as Neanderthals had the capacity to structure their tool-making

behaviour in terms of hierarchies, they would *ipso facto* have had the capacity to structure their processing of language in terms of such hierarchies. But if Neanderthals had a capacity to process language shared with tool making, it does not follow that they used it to process language. They could have used this capacity solely for structuring their tool-making behaviour. Nor does it follow that Neanderthals had language as a cognitive system, and to have been able to process language, Neanderthals needed to have had language as such a system. A basic problem with the inferential step D is that it is not underpinned by an adequate linguistic ontology. Such an ontology draws a principled distinction between language as a cognitive system and the use of language to process, i.e., produce and comprehend, linguistic utterances. Finally, the warrant for inferential step D is suspect in that the co-evolutionary hypothesis on which it is based represents but one of a range of competing hypotheses about the origin of language.[15]

The problematic nature of the warrants for the two inferential steps used in the knapping inference does not represent the only threat to the soundness of this inference. An additional threat is posed by the contentious nature of the grounding of this inference: the claim, stated in box A in Figure 8.1, that modern humans knap Palaeolithic stone tools by means of action sequences structured in terms of hierarchies and recursion. With reference to this claim, Stout and Chaminade (2009) maintain that:

> Recursion has been singled out by some as *the* core element of language unique to humans (Hauser et al. 2002), but it is not clear that linguistic recursion is really so different from the hierarchy of behavioural chunks seen in stone tool-making or any other motor behaviour. (Holloway 1969) (Stout and Chaminade 2009: 92)

In a later article, Stout and Chaminade (2012) reiterate their 'not-really-so-different' view:

> Accumulating evidence is increasingly supportive of technological hypotheses of language origins, and goes a long way towards allaying concerns that the similarity in the hierarchical, combinatorial organization of the two domains is a superficial one. (Stout and Chaminade 2012: 82)

Giving specifics of how recursion features in Palaeolithic tool-making, Stout (2011: 1053) asserts that 'embedding of flake detachments within flake detachments is formally recursive, with the theoretical potential to embed an infinite number of subordinate detachments (i.e. detach a flake to prepare to detach a flake to prepare to detach a flake…)'. The recursive embedding of flake detachments is illustrated by Stout (2011: 1052) with aid of a tree diagram claimed to represent 'Early Acheulean' flake production in the knapping of so-called Karari scrapers. This is shown in Figure 8.2.

This diagram depicts recursive flake production, according to Stout, as optional nodes corresponding to second through *n*th-order embedded

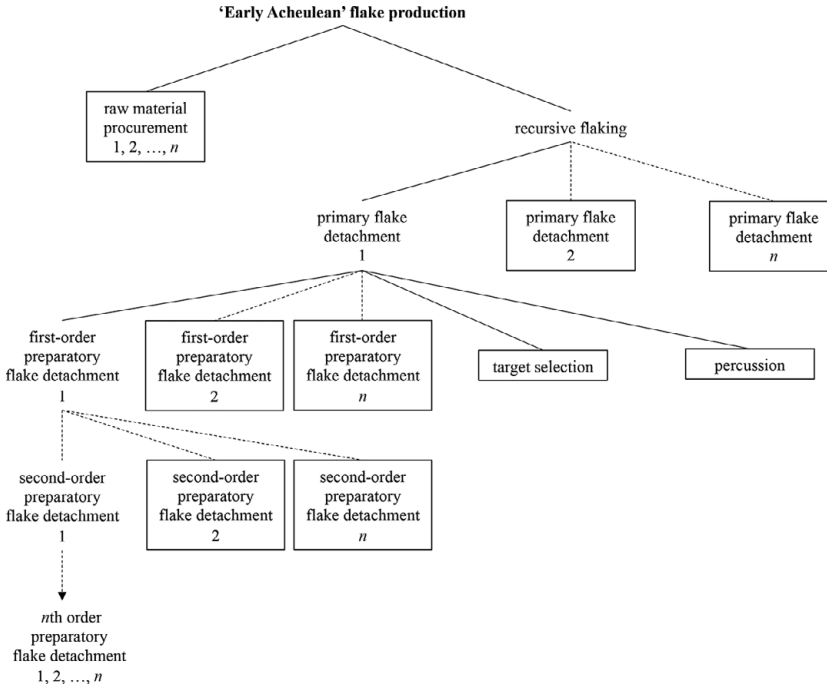


Figure 8.2 Recursive flake production in making Karari scrapers (Stout 2011: 1052)

detachments. He, moreover, contends that, as in recursive linguistic syntax, there are pragmatic limits to the number of embedded nodes in recursive flaking.

Which brings us to what is problematic with the grounding of the knapping inference. Berwick and Chomsky (2017: 171) argue that, contrary to what is claimed by Stout, Chaminade and others, the motor combinatory operations involved in the knapping of stone tools fail to display certain properties that crucially characterise the hierarchical structures of human syntax. Calling the linguistic combinatory operation 'Merge', Berwick and Chomsky (2017: 171) observe that Merge combines any two syntactic objects into a single new combined syntactic object along with a label. For instance, Merge combines a verb like 'ate' and a noun phrase (NP) 'apples' to form a new complex object, 'ate apples', with the label verb phrase (VP). Merge further applies recursively to its own output. The result of this is that syntactic objects of the same sort are often embedded inside one another. This is illustrated by [John [$_{VP}$ ate [$_{NP}$ apples[that [$_{VP}$ were old]]]], where the upper VP contains a second VP.

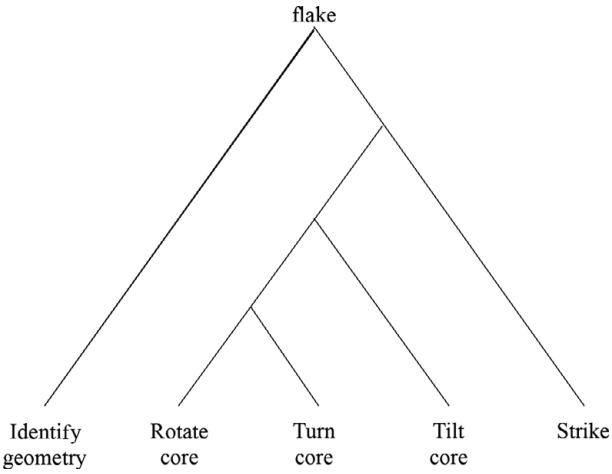


Figure 8.3 Proposed action sequence of a basic 'flake' operation in tool knapping, displayed in terms of a tree-like organisation (Berwick and Chomsky 2017: 171)

Berwick and Chomsky (2017) set out the properties that crucially distinguish syntactic structures created by Merge from motor actions involved in knapping with reference to a hierarchical tree that they attribute to Stout. According to them, Stout has arranged into this tree the sequence of motor actions used to detach a flake from a stone in making a handaxe. This sequence comprises the actions *identify-geometry, rotate-core* (of the stone), *turn-core, tilt-core,* and finally *strike*. The tree concerned is shown in Figure 8.3.

The first of the properties that distinguish syntactic structures from sequences of motor actions involved in stone-tool knapping concerns labels assigned to combined objects. In this connection, Berwick and Chomsky (2017: 171) point out that in the case of '. . . language – and Merge – a verb and NP as in "eat apples" are grouped as a single constituent because they serve as a distributional equivalence class for which one has independent evidence'. Continuing, Berwick and Chomsky ask, 'But what does it mean to group together "rotate" and "turn" as a natural (syntactic action) class apart from "tilt"? Why not simply list the leaves of this tree, without any implied hierarchical structure?' It is not clear to them that the grouping of the operations involved in knapping into a tree structure 'even makes sense'. Recall here that Wynn earlier argued a similar point: unlike the sequences of speech, the tool-making sequences do not have hierarchical structure: tool-making sequences consist of actions organised like strings of beads (Section 8.2.2).

A second difference claimed to crucially distinguish syntactic structures from sequences of motor actions involved in stone-tool knapping concerns the beginnings and ends of hierarchical structures. Fleshing out this point, Berwick and Chomsky (2017: 171) note that in the case of syntax, hierarchical structures like verb phrases have matched beginnings and ends. They note that it has been claimed that motor actions correspond to syntax in that a knapping action has a beginning and an end. But, they point out, this correspondence is not a genuine one, it being simply 'the ineluctable result of an imposed causality'. Referring to Moro (2014), Berwick and Chomsky maintain that:

> while it is certainly true that there can be an apparently nested sequence of motor actions like, open a door; then open a bottle; then close a bottle; then close the door, we all know that this is not a necessity, as legions of parents closing doors left open by children will attest. (Berwick and Chomsky 2017: 172)

A third of the differences at issue concerns, according to Berwick and Chomsky (2017:172), the fact that there is no indication in the case of motor actions of copied actions that are not 'pronounced'. By contrast, in the case of the linguistic example 'guess what John ate (what)', the second occurrence of 'what' is not externalised. This follows from Merge and principles of efficient computation, they assert. They continue:

> This does not seem to readily carry over to motor actions; it might make some sense to execute exactly the same action twice, but how (or why) would one copy and then 'execute' an action, but suppress it in an externalized sense?' (Berwick and Chomsky 2017: 172)

Taken together, the three differences between syntax and tool-making action sequences demonstrate, according to Berwick and Chomsky (2017: 172), that such sequences '... simply don't follow what one would expect from the output of Merge, except in a metaphorical sense'.

This brings us to the implications of Berwick and Chomsky's analysis for the soundness of the knapping inference represented schematically in Figure 8.1. If the three differences between syntax and the sequences of motor actions involved in knapping identified by them are genuine, they imply the following:

Implications of Berwick and Chomsky's Analysis for the Knapping Inference

(a) It is not the case that the processing of language and the knapping of Palaeolithic stone tools by modern humans are structured in terms of similar hierarchies and recursion.
(b) Consequently, the inference that Neanderthals knapped stone tools by means of actions structured in terms of hierarchies and recursion is ungrounded.

(c) Consequently, the inference that Neanderthals processed language by means of action sequences structured in terms of hierarchies and recursion is ungrounded.
(d) Consequently, the knapping inference is unsound.

As for (a), it says in effect that the claim concerned fails Wynn's (1993: 389) Critical Feature Condition stated in Section 8.2.2: tool behaviour can be used as evidence for language only if the former and the latter share the *same* critical features.

8.4 Conclusion

The preceding section has identified two substantial reasons for being sceptical about the soundness of the knapping inference. First, the warrants of the two inferential steps – represented in Figure 8.1 by arrows B and D respectively – taken in this inference are too weak to properly license them. Second, the first inferential step lacks the required empirical grounding. And even if both these reasons could be shown to be less than substantial, this inference cannot yield the conclusion that Neanderthals had language as a cognitive capacity. For, the linguistic ontology underlying such an inference fails to draw two important distinctions: (i) the distinction between a capacity for the processing of language and the actual processing of language and (ii) the distinction between the processing of language as a form of behaviour and language as a cognitive capacity.

9 Teaching Stone-Tool Making

9.1 Connecting Stone Tools via Teaching to Language

Did a form of language play a role in the teaching/learning of stone-tool making by Palaeolithic hominins, including Neanderthals? If it did, what was the nature of that role? Over the years, these questions have received diverging and controversial answers. Some forty years ago, Grover Krantz (1980: 776) claimed that '[s]uperior language would facilitate the teaching of more sophisticated toolmaking'. To this, Thomas Wynn (1980: 788) responded that 'the learning of technology is not primarily linguistic, let alone verbal'. A decade later, Nicolas Toth and Kathy Schick (1993: 354–55) stated in a much cited article that '[e]ven if bifacial technology was learned primarily through demonstration and non-verbal communication, it may well have depended for its long-term survival on verbalized knowledge and traditions'. With Paul Graves (1994: 165) citing the following year Tim Ingold's (1993: 338) contrary view that, in the case of the archaeological record, '. . . it is not necessary for the effective transmission of everyday practical knowledge that it be expressible in verbal form'.

9.2 The Knapping-Pedagogy Inference

In more recent work, the role of language in the teaching/learning of the knapping of Palaeolithic stone tools has been investigated experimentally. In the experiments, comparison groups of modern human subjects are taught/learn the skills of knapping stone tools with the aid of various forms of transmission. From the results of such experimental studies, scientists have drawn conflicting inferences about the role of (spoken) language/verbal communication/speech in the teaching of knapping skills to modern humans. Moreover, from the conclusions of such inferences some of the experimenters have drawn further inferences about the origin and evolution of language. The inferences drawn by Morgan et al. (2015) and Cataldo et al. (2018) are particularly instructive from this perspective. So let us consider these along with similar inferences by other authors.

Morgan et al. (2015: 1) conducted a large-scale experimental study to investigate the efficacy of transmission of Oldowan tool-making skills by means of five different transmission mechanisms along chains of 184 modern human adult subjects. Their (2015: 6) aim, more specifically, was '... to provide insights into which forms of communication might have been selected for as a result of reliance on tool use'. As transmission mechanisms, they used the following five: (i) reverse engineering, (ii) imitation/emulation, (iii) basic teaching, (iv) gestural teaching and (v) verbal teaching. From their test results they drew, among others, the conclusions (a) and (b), singling out (a) as their 'central finding':[1]

Morgan et al.'s Conclusions about the Role of Language in Teaching Knapping Skills to Modern Humans

(a) 'the social transmission of Oldowan technology is enhanced by teaching and, in particular, by [verbal – R.B.] language'. (Morgan et al. 2015: 10)
(b) 'verbal teaching increases [knapping – R.B.] performance relative to gestural teaching.' (Morgan et al. 2015: 7)

From these conclusions, Morgan et al. (2015) go on to draw, among others, the following further conclusions about language evolution:

Morgan et al.'s Conclusions about Language Evolution

(a) 'teaching or proto-language may have been pre-requisites for the appearance of Acheulean technology'. (Morgan et al. 2015: 1)
(b) 'This [i.e., the authors' – R.B.] work supports a gradual evolution of language, with simple symbolic communication preceding behavioural modernity by hundreds of thousands of years'. (Morgan et al. 2015: 1).
(c) 'this [i.e., the authors' – R.B.] work supports an early origin for language'. (Morgan et al. 2015: 6)

To be able to reconstruct Morgan et al.'s full composite inference, it is necessary to take into account the following as well: (i) their inferences (a)–(c) are ultimately grounded in data yielded by their experimental study of the transmission of Oldowan tool-making skills to modern human adult subjects and (ii) Neanderthals existed for hundreds of thousands of years and made sophisticated Mousterian stone tools such as scrapers and handaxes. Taking (i) and (ii) into consideration, Morgan et al.'s composite inference includes two explicit inferential steps and one that is implicit. The two explicit steps are represented below by the arrows B and D in Figure 9.1, the implicit one by arrow F.

As for the implicit nature of inferential step F: Morgan et al. do not explicitly mention Neanderthals. However, if the evolutionary ancestors of Neanderthals – referred to by Morgan et al. as 'Oldowan hominins' and 'Acheulean hominins' – had verbal language, Neanderthals, in all likelihood,

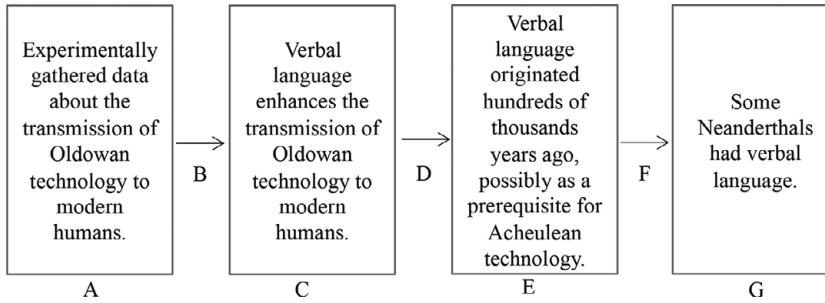


Figure 9.1 The knapping-pedagogy inference

had it too. And, extending Morgan et al.'s line of reasoning, if verbal language were a prerequisite for Acheulean technology, it is unlikely that Neanderthals could have made their more sophisticated Mousterian stone tools if they lacked verbal language.

As far as its soundness is concerned, this inference is problematic in a number of ways. The first that strikes is the disparity between the logical force of the conclusion in box C and that of the conclusion in box E. That is, in terms of the former conclusion, verbal language *enhanced* the teaching of the knapping skills concerned to modern humans. But the latter conclusion asserts that early hominins *had* verbal language – possibly as a *prerequisite* for Acheulean technology. However, to be able to draw this conclusion about early hominins from the one about modern humans, verbal language had to be a *necessity* or *prerequisite* for teaching to modern humans the skills at issue. The inferential step from something that is less than necessary to another thing that is necessary is evidently unsound. Alternatively, the conclusion about early hominins needs to be weaker in regard to logical force, stating that verbal language might have enhanced the teaching of knapping skills to such hominins. Or, consonant with Morgan et al.'s (2015: 7) conclusion that in the case of modern humans 'verbal teaching increases [knapping – R.B.] performance relative to gestural teaching', Morgan et al. may draw the following, significantly weaker conclusion only: 'Verbal teaching could have increased the knapping performance of early hominins relative to gestural teaching, i.e., if they had both verbal and gestural language'. Conclusions weakened in these ways would be quite speculative.

Morgan et al.'s knapping-pedagogy inference, and specifically inferential step D, is problematic in a second way too. By means of this step, features of a phenomenon in a source domain – teaching knapping skills to modern humans – are projected onto an object domain – teaching knapping skills to early hominins. Inferential step D, accordingly, represents analogical

reasoning. To be successful it, accordingly, needs to meet the same conditions as the knapping inference analysed in Chapter 8. This implies that there have to be sufficiently many relevant similarities and no essential differences between the phenomenon in the source domain and that in the object domain. Morgan et al. have omitted to show that inferential step D does meet those conditions. This omission is unfortunate in view of the behavioural and cognitive differences between modern humans, including those who participated in the authors' experiments, and early hominins who lived hundreds of thousands years ago.

Whereas the first two problems with Morgan et al.'s knapping-pedagogy inference spring from the nature of inferential step D, a third concerns the grounding of this step in the conclusion represented in box C in Figure 9.1. Thus, Morgan et al.'s conclusion about the importance of verbal language in teaching knapping skills to modern humans is consonant with some of the conclusions yielded by an experimental study conducted by Lombao et al. (2017), but it conflicts with conclusions drawn by Putt et al. (2014) and Cataldo et al. (2018) from results of similar studies. Consider in this regard the following:

Conclusions of Other Authors about the Role of Verbal Language in Teaching Knapping Skills to Modern Humans

(a) Lombao et al. (2017: 1): 'the apprentices improved their knapping skills in teaching conditions – both gestural and verbal communication – and specially through the latter'.[2]
(b) Lombao et al. (2017: 8): 'our results agree with contrasting studies, such as Morgan et al. with regard to variables referring to technical capabilities'.
(c) Putt et al. (2014: 96): 'verbal interaction is not a necessary component of the transmission of the overall shape, form, and symmetry of a biface in modern human novice subjects, and it can hinder the progress of verbal learners'.[3]
(d) Cataldo et al. (2018: 3): 'speech is an inefficient means of transmission of Oldowan tool making skills in comparison to gesture'.[4]
(e) Cataldo et al. (2018: 6): 'Our study has presented an experimental rejection of a direct link between speech and the teaching of tool-making skills'.
(f) Cataldo et al. (2018: 1): 'subjects instructed by speech alone underperform in stone tool-making experiments in comparison to subjects instructed through either gesture alone or "full language" (gesture plus speech)'.

The reason why the experimental results and conclusions of Morgan et al. are at odds with those of Putt et al. and Cataldo et al. requires clarification. In the absence of clarity, there is reason to be concerned about the robustness of the grounding of Morgan et al.'s conclusion that verbal language originated hundreds of thousands of years ago.

From their conclusions (d), (e) and (f) about the role of verbal language and gesture in the teaching/learning of knapping skills by modern humans, Cataldo et al. (2018) draw further conclusions about the evolutionary emergence of language. Asserting the following, these further conclusions of theirs differ from those drawn by Morgan et al. (2015) about this phenomenon:

Cataldo et al.'s Conclusions about Language Evolution

(a) 'gesture was likely to be selected over speech as a teaching aid in the earliest hominin tool-makers'. (Cataldo et al. 2018: 1)
(b) 'speech is unlikely to have evolved as a tool-making teaching aid superior to gesture'. (Cataldo et al. 2018: 1)
(c) 'gestural language may have evolved to enable tool-making in earlier hominins, while speech may have later emerged as a response to increased trade and more complex inter- and intra-group interactions in Middle Pleistocene ancestors of Neanderthals and *Homo sapiens*'. (Cataldo et al. 2018: 1)

The question, now, is whether these further conclusions by Cataldo et al. are more credible than those reached by Morgan et al. about the evolution of language. Not really. Thus, Cataldo et al.'s conclusions are overtly speculative: conclusion (a) stated in terms of 'likely to be', conclusion (b) in terms of 'unlikely to have' and conclusion (c) in terms of 'may have evolved' and 'may have ... emerged'. Moreover, the crucial inferential step taken by Cataldo et al. represents an instance of analogical reasoning – projecting properties of modern humans onto early hominins. And, like Morgan et al., they omit to show that this inferential step satisfies the conditions applicable to analogical arguments. Finally, the grounding of this inferential step is problematic. Recall that this grounding consists of Cataldo et al.'s conclusions (d), (e) and (f) about the role of language in teaching knapping skills to modern humans. To have the required logical force these conclusions need to establish a necessary link between the use of gesture or full language and the teaching of the skills concerned. They fail to do this, however. In terms of conclusion (d), this link is the significantly weaker one stated in terms of the notion of 'an inefficient means of transmission'. In conclusion (f), they portray this link with the aid of a notion of 'underperforming'. In addition, Cataldo et al.'s conclusions about the role of language in the teaching of knapping skills to modern humans are not uncontentious, being at odds with conclusions drawn by Morgan et al. (2015) and Putt et al. (2014) about such teaching.

9.3 Conclusion

Whether Neanderthals had language cannot be learned from findings of recent experiments conducted to establish the role of language in the teaching of

Oldowan knapping skills to modern humans. This is what emerged in the preceding section. An obvious question is 'Why is this so'? Berwick and Chomsky (2017) have answered this question as follows:

> consider language as a necessity for toolmaking instruction. Many anthropologists have proposed this; see Toth and Schick (1993), among others. However, the attempts to confirm this via direct experiment with modern humans – using comparison groups limited to visual imitation as opposed to those where instruction is allowed – have yielded decidedly mixed results. Ohnuma, Chiaoki, and Takeru (1997) found that superior visual imitation/instruction trumped language use – speculatively of interest given the larger-than-human Neanderthal visual cortex. Any conclusion that language must have been operating for tool making must remain sheer speculation. (Berwick and Chomsky 2017: 171)[5]

The preceding section provides support for the criticism that the conclusions concerned are speculative. It has also, however, identified a deeper-lying reason why such conclusions are untenable: they have been drawn by means of unsound inferential steps. First, in the case of Morgan et al.'s (2015) composite inference, the first inferential step – represented by arrow B in Figure 9.1– lacks the adequate grounding. That is, it starts from contentious conclusions about the role of verbal/gestural language in the teaching of knapping skills to modern human subjects. This grounding, moreover, is wanting in the sense that, in terms of its constituent conclusions, verbal teaching is *not necessary* for the teaching of Oldowan knapping skills to modern human subjects. Rather, verbal teaching only *'enhances'* the social transmission of these skills, and *'increases'* knapping performance relative to gestural teaching. Second, the inferential step concerned is an analogical one but has not been shown to satisfy the conventional conditions applicable to analogical inferences. The comparable inferential step in Cataldo et al.'s composite inference is similarly problematic: lacking both uncontroversial grounding of the appropriate kind and the justification needed for analogical inferences.[6]

10 Hunting Big Game

10.1 'Excellent Tacticians, Casual Executioners and Discerning Diners'

Neanderthals are portrayed as having been 'proficient hunters capable of bringing down a variety of game' (Churchill 2012: 246). The focus here, though, is on their alleged successful hunting of large animals such as reindeer, horse, bison, aurochs, mammoth and rhinoceros (Gaudzinsky-Windheuser and Roebroeks 2000: 497; Gaudzinsky-Windheuser and Roebroeks 2011: 61, 69; Kuhn and Stiner 2006: 956–57; Marín et al. 2017: 2; Niven et al. 2012: 624; Roebroeks 2006: 431; White et al. 2016: 18; Wynn and Coolidge 2012: 29).[1] More specifically, this chapter focuses on the inference that has been drawn from this behaviour about whether they had language.

The success achieved by Neanderthals at hunting big game with the aid of simple hand spears is attributed to various, complementary factors.[2] To begin with, they are believed to have had a good understanding of the behavioural characteristics of the animals they hunted (Britton et al. 2011: 176; Churchill 2014: 246; Marín et al. 2017: 2). They are, moreover, credited with detailed knowledge not only of the general topography of the landscapes in which they hunted but also of minute particulars of the hunting grounds that they frequented. As observed by Wynn and Coolidge (2012: 46), '[t]hey knew every boulder, cliff, and defile, and used them to advantage'. Other factors that are considered to have contributed to Neanderthals' hunting prowess include the raw courage, fearlessness and high tolerance for risk that they displayed when they faced ferocious prey at close quarters (Wynn and Coolidge 2012: 29, 46, 164–65).

Most pertinent to the concerns of this chapter, however, is the finding that Neanderthals practised what has been dubbed 'social', 'collective', 'cooperative' or 'communal hunting': they cooperated in planning hunting trips and in killing prey capable of actively defending themselves (Churchill 2014: 244, 245; Gaudzinsky-Windheuser et al. 2018: 1; Marín et al. 2017: 1, 13, 15; Roebroeks 2006: 431; Wynn and Coolidge 2012: 44). These include groups of large animals such as bison, aurochs, rhino, horse and reindeer that were

hunted by parties of Neanderthals.[3] The hunters went about this, according to White et al. (2016:1), not by pursuing, stalking and killing isolated pre-selected individuals from a herd; they 'rather ambushed whole groups, which they slaughtered indiscriminately'. Elaborating graphically on this, White et al. picture as follows the ambushing of a group of horses at a Middle Palaeolithic kill site located in a deep, narrow ravine-like valley at Zwolen in Poland:

> [a] Neanderthal hunting party divided into two groups, which acted in unison while serving different purposes. One group tracked harem groups on the narrow grassy flood plain, in places constricted to bottlenecks by the river on one side and the cliffs on the other. The low vegetation meant that the pursuers would remain invisible to the horses and as such would not have constituted a direct or sudden threat. The other group lay in wait further down the valley, out of sight around the bottleneck. Advancing from a position that faced the bottleneck, the pursuing group violated the horses' flight zone, setting them running in their familiar and predictable straight-line pattern. As the horses rounded the bottleneck, the second ambush party struck, a clear and present danger that caused the animals to scatter in all directions, Some horses attempted to scale the steep valley walls; others ran into the river, others continued to run out of the bottleneck or turned in the opposite direction. In the chaos, Neanderthals killed indiscriminately at close quarters; confused horses trampled other horses. Later, and at their leisure, the hunters selected which animals to butcher, and took from these only what they wanted'. (White et al. 2016: 14)[4]

In practising such ambush hunting, Neanderthals showed themselves to be 'excellent tacticians, casual executioners and discerning diners', as White et al. (2016: 1) phrase it.

10.2 The Hunting Inference: Its Anatomy

Exactly how has Neanderthals' ambush hunting been inferentially brought to bear on the question whether they had language? By means of the composite inference assembled from various simple inferences found in the literature, and shown in Figure 10.1.

As for the particulars of the hunting inference, consider to begin with the first inferential step, represented by arrow B in Figure 10.1, and, more specifically, the features F_1, F_2, F_3 and F_4 of Neanderthal ambush hunting referred to in box A. Forming, along with other similar features, the grounding of inferential step B, these four features entail the following:

> *Feature F_1*: Neanderthal ambush hunting was what Gaudzinski-Windheuser et al. (2018) describe as a 'confrontational' way of hunting (p. 1087) and as 'close-range' hunting (p. 1090) that placed participants at the risk of being injured by large mammals. According to these authors (2018), such hunting, consequently, required 'close cooperation between participants' (p. 1087) and

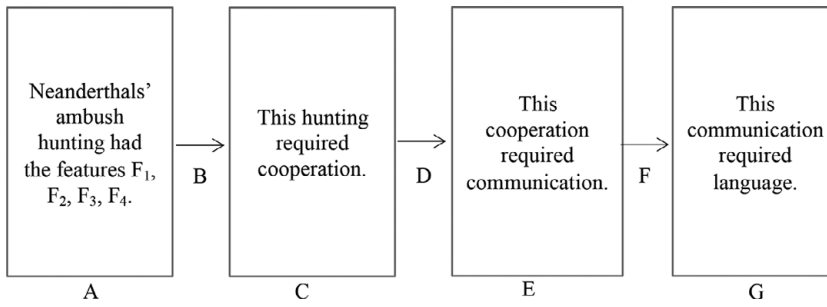


Figure 10.1 The hunting inference

'fostered intensive cooperation between participants' (p. 1090). These views of Gaudzinski-Windheuser et al. (2018) indicate that they take inferential step B in Figure 10.1: from the claim that Neanderthals engaged in confrontational hunting, it is inferred that they attacked their prey in a cooperative, coordinated way. Thereby, Gaudzinski-Windheuser et al. (2018) draw the conclusion in box C of Figure 10.1.[5]

Feature F_2: The prey included large, heavy animals – rhinoceros (ungulates), horse (equids) and deer (cervids) – that 'posed a substantial risk' to Neanderthal hunters, according to Marín et al. (2017:15). 'Therefore', these authors assert (2017: 15), '... cooperative organization of hunting groups would have been an effective way to reduce risk in the capture of these large ungulates'. Marín et al. (2015: 2) infer this from their findings about the mortality profiles identified in the faunal assemblages recovered at Abric Romaní, a Neanderthal rock shelter located in the north-eastern portion of the Cinglera del Capelló cliff, 45 kilometres north-west of Barcelona, Spain.

Feature F_3: Large carcasses of over 300 kilograms were transported by Neanderthal hunters from ambush sites to the Abric Romaní rock shelter. The transport strategies required for this 'demonstrate', according to Marín et al. (2015: 13), 'group cooperation' by Neanderthal hunters.

Feature F_4: In terms of White et al.'s (2016: 14) account, a party of Neanderthals engaged in hunting horse divided into two groups: a tracking/driving group and an ambush group. These two groups, White et al. (2016: 14) assert, 'acted in unison while serving different purposes'. A further instance of this kind of cooperation is derived by White et al. (2016: 16) from Behr's (1990) account of

> Neanderthals' hunting of reindeer. This cooperation probably involved that pairs or groups of hunters divided their duties into 'distractors/attractors' and 'ambushers'.

As observed by Wynn and Coolidge, the cooperation among Neanderthal hunters – inferred by means of inferential step B – was planned. Thus, they consider Neanderthals' hunting methods as being 'our primary evidence for Neanderthal planning', remarking that:

> Clearly Neandertals anticipated future events and made decisions with this knowledge in mind. Setting up ambushes on permanent game trails in the Caucasus is conclusive evidence that Neandertals did not wander aimlessly around their territories. (Wynn and Coolidge 2012: 45)

According to Wynn and Coolidge (2012: 43), no one disputes that Neanderthals planned ahead. Furthermore, their planning was distinct from that of chimpanzees hunting together in that Neanderthals had long-term memories of hunting scenarios and episodic memories of past hunts. As a consequence, Neanderthals would have had a 'ready-made plan of action', Wynn and Coolidge (2012: 44) maintain.

This brings us to the second inferential step in the hunting inference, the step represented by arrow D in figure 10.1. Bearing on this step is another important difference in planning between humans such as Neanderthals and chimpanzees, noted by Wynn and Coolidge. This step, recall, starts from the conclusion that Neanderthals hunted cooperatively and arrives at the further conclusion that such hunting required communication. According to Wynn and Coolidge (2012: 44), chimpanzees do cooperate when they hunt, and do appear to communicate a joint goal through glances. Having done that, however, they do not send one another information to help coordinate action, and this, in the view of Wynn and Coolidge (2012: 44), is what Neanderthals did do:

> Effective hunting on the scale practiced by Neandertals would almost require some coordination via communication of information. (Wynn and Coolidge 2012: 44)

To assert this is clearly to take inferential step D. Wynn and Coolidge are not alone in doing this. Thus, Rendu et al. (2012: 55) have done likewise, asserting that the communal hunting strategies practised by Neanderthals '. . . require the participation of a large number of individuals. They also imply an important degree of communication among participants, active cooperation, and a defined role for every one'.

We are left, then, with the third inferential step, represented by arrow F in Figure 10.1, in the hunting inference. From the conclusion that Neanderthal hunting required some coordination via communication of information, Wynn and Coolidge (2012: 44) draw the further conclusion that Neanderthals had language. Thus, they assert that '[f]or this reason – [i.e., that Neanderthals

needed to communicate information in order to hunt effectively – R.B.] (and others) we suspect that Neandertals had language'. This gives rise to the question 'For communicating *what* would Neanderthals have needed language?' According to Wynn and Coolidge (2012: 131), Neanderthals would have needed language for referring to features of the landscape, to routes and to locations in their hunting territories. This would have enabled widely dispersed foraging groups to converge at such killing sites as La Cotte.[6] Most critical of all, according to Wynn and Coolidge, with the aid of language Neanderthal hunters would have been able to indicate 'hunting tactic prior to execution'.

What, then, would Neanderthal hunters have needed in the way of language, for communicating information about these matters? 'Labels', according to Wynn and Coolidge:

> Even more useful [than the labels used by an experienced knapper for focusing the attention of a novice in teaching her/him Levallois flaking – R.B.] would be labels for features of the landscape, and perhaps even routes, enabling Neandertal hunters to refer to any location in their territory. Such labels would almost have been required if widely dispersed foraging groups needed to congregate at certain places (e.g., La Cotte). Most critical of all, in a natural selection sense, would be an ability to indicate a hunting tactic prior to execution. These labels must have been words of some kind.' (Wynn and Coolidge 2012: 131)

'Labels' or 'words of some kind', however, may not have been the only ingredients of Neanderthal language, as conceived of by Wynn and Coolidge (2012), but it is less than obvious what the other constituents may have been, the authors' conception of 'language' not being fully transparent. The source of its opacity is that they do not explicitly distinguish in this context among language as a cognitive system, the actual use of language for the purpose of communication, and speech as the use of language in the vocal-auditory modality. Thus, they make assertions such as the following:

> 'LANGUAGE [emphasis in original – R. B.] is a sophisticated and subtle form of communication.' (Wynn and Coolidge 2012: 127)

> 'Neanderthal communication must have been different from modern language.' (Wynn and Coolidge 2012: 130)

> 'There are three major components of language proper … Words … Rules … [and] … Usage.' (Wynn and Coolidge 2012: 124–26)

Adding to the opacity are some 'suggestions about Neanderthal communication' made by Wynn and Coolidge (2012). In terms of these suggestions, 'Neanderthal communication' comprises disparate entities such as 'speech' (p. 131), 'stock sayings' (p. 131), 'questions, commands, exclamations, and perhaps directional reference (indicatives)' (p. 132), as well as 'aspect words, or morphological rules, or even grammatical rules' (p.132).

If the claims made by Wynn and Coolidge about the linguistic attributes of Neanderthals were interpreted within the framework of a principled linguistic ontology, the following would be among the results:

Linguistic Attributes of Neanderthals (pace Wynn and Coolidge 2012)

(a) Neanderthals had language in the form of a cognitive system, its main components being: (i) a large lexicon that included referential words, aspectual words and idioms and (ii) (possibly) morphological and grammatical rules for combining these lexical elements into various types of sentences: questions, commands, exclamations and indicatives.
(b) Neanderthals used speech (the vocal-auditory modality) to utter sentences.
(c) Neanderthals used these utterances for the purpose of communicating old and new information as well as thoughts.
(d) Neanderthals used pragmatic (environmental and social) means for disambiguating utterances.

Before turning to the matter of the soundness of the hunting inference, it needs to be noted that, as reconstructed in Figure 10.1, inferential step F represents a view held by Wynn and Coolidge (2012). The other authors – Gaudzinsky-Windheuser et al. (2018), Marín et al. (2015), Marín et al. (2017), Rendu et al. (2012) and White et al. (2016) – whose work underlies some of the components of the hunting inference do not indicate whether they would be inclined to take step F.

10.3 The Hunting Inference: Its Soundness

The hunting inference has a solid empirical basis. That is, inferential step B is grounded in unchallenged findings by Gaudzinsky-Windheuser et al. (2018), Marín et al. (2015), Marín et al. (2017), Rendu et al. (2012) and White et al. (2016) about features of the ambush hunting practised by Neanderthals at specific sites. Moreover, inferential step B – which moves from these findings to the conclusion that this hunting required carefully planned cooperation – has not turned out to be controversial. The second step, D, represents a similarly uncontentious inferential move to the further conclusion that this cooperation required communication. These observations mean that the first four components – A, B, C and D – of the hunting inference have not given rise to concerns about its soundness. This, however, is not the case with the third inferential step, F, which moves from Neanderthal hunters' having had to communicate with one another to their having needed language as portrayed by Wynn and Coolidge (2012) for this communication.

The question, then, is 'What are the doubts about the soundness of F?' There are two:

Doubts about Inferential Step F

(a) If Neanderthal hunters required a form of language to communicate with one another, it need not have been the particular form attributed to them by Wynn and Coolidge (2012).
(b) If Neanderthal hunters required a means to communicate with one another, it need not have been a form of language.

As for (a), let us assume for argument's sake that Neanderthal hunters did need a form of language for communicating with one another. The form of language attributed by Wynn and Coolidge (2012) to them, however, is strikingly complex. As noted in Section 10.2, it comprises a large lexicon that included not only referring words and idioms but also aspectual words, and (possibly) morphological rules and grammatical rules with the aid of which a wide variety of sentence types – questions, commands, exclamations, and indicatives – could be formed. But there are significantly simpler forms of language that Neanderthal hunters could have used for their communication. A first is illustrated by Riau Indonesian, a variety of Malay/Indonesian spoken by the inhabitants of Riau province in east-central Sumatra, Indonesia. Investigated in depth by David Gil (1994, 2008a, 2008b, 2010, 2013, 2015), Riau Indonesian is acquired as a native language by most or all of the children growing up in that province. As also observed by Gil (2013: 92), it serves as a lingua franca for *inter*-ethnic communication, gradually replacing other languages and dialects as a vehicle for *intra*-ethnic communication.

On Gil's (2008a: 127, 2010: 30) analysis, Riau Indonesian is quite limited in regard to morphological, syntactic and semantic means. It has, for instance, no syntactic classes (parts of speech) such as verbs and nouns, no inflectional morphology, no syntactic subordination and mostly free word order. It uses parataxis and pragmatics to express subordination, prosody to indicate constituency and semantic biases to order words in short sentences, e.g., Actor > Action.[7] As observed by Gil (2008a : 126, 2010: 23), the two content words making up the sentence *Ayam makan*, 'Chicken eat', are both members of the single open category 'sentence'. So, *Ayam makan* is a simple juxtaposition or coordination of two sentences. *Ayam makan* has the vague meaning of 'Something to do with chicken and eating'. This meaning, however, can be made more precise by speakers' using their pragmatic competence and plumbing the extralinguistic context, as Gil (2010: 23) is at pains to explain. As a result, the sentence *Ayam makan* can be understood in many different ways, including 'The chicken is eating', 'I ate the chicken', 'The chickens that were eaten', 'A chicken that was being eaten', 'Where the chicken is being eaten', 'The reasons chickens eat', and so on. Despite being limited in regard to morphological, syntactic and semantic means, Riau Indonesian does not lack expressive power in any semantic domain, in Gil's (2008a: 127, 2010: 30) view.

The grammar of Riau Indonesian is close to pure linear grammar on Jackendoff and Wittenberg's (2017: 219, 222) analysis. A language with linear grammar is, within their hierarchy of grammatical complexity, a simple form of language that: (i) lacks syntax and morphology, structuring its utterances through a direct mapping between semantics and phonology; (ii) has no syntactic categories or syntactic phrases, and so no recursion; (iii) has no functional categories such as tense, agreement and case inflection; (iv) has no derivational morphology; (v) makes some use of word order to convey semantic relations, requiring for instance that agents should precede patients; and (vi) bases many other semantic relations on pragmatics and discourse context.

Interestingly, on Jackendoff and Wittenberg's analysis (2014: 78–79, 2017: 221–22), Riau Indonesian is not the only modern language variety that is close to linear grammar. They (2017: 221) hypothesise that 'a variety of modern-day linguistic systems have the flavour of linear grammar'. These include: incipient pidgins, being early-stage-contact languages; the basic variety, resulting from late second-language acquisition; home signs, i.e., the languages invented by deaf children who have not been exposed to a signed language; and village sign languages such as Al-Sayyid-Bedouin that develop in isolated communities many of whose members suffer from hereditary deafness.[8]

Returning to the language attributed by Wynn and Coolidge (2012) to Neanderthals, a first question to arise here is this: 'Why would these hunters have needed such a complex form of language for communicating with one another if the significantly simpler one instanced by Riau Indonesian would have been adequate?' Furthermore: 'Why, if the other instances of restricted modern-day linguistic varieties that use little more than linear grammar can function adequately as means of communication?' In sum, why is it necessary to attribute more than a linear grammar to Neanderthal hunters, assuming for argument's sake that they needed a form of language at all? In the absence of answers to these questions, inferential step F is unwarranted, giving rise to the doubt about the soundness of the hunting inference stated as (a) above.[9]

But there is an even more fundamental doubt about the soundness of this inference: if Neanderthal hunters needed an adequate means to communicate with one another, it does not follow that it had to be a form of language, not even a simple one with a linear grammar. In terms of an alternative account, Neanderthal hunters could have engaged in what Michael Tomasello (2008: 15, 2014: 68, 50) depicts as the cooperative communication that took place inside joint collaborative activities of early hominins. Cooperative communication, Tomasello (2014: 78) states, was the solution to the problem of 'how to coordinate these collaborative activities as they became ever more complex'.

The means used for the first forms of uniquely human cooperative communication were, on Tomasello's account (2014: 49), natural gestures, specifically pointing gestures and nonconventional iconic gestures or pantomimes.[10]

Executed with the aid of an index finger or lips or chins in some cultures, pointing is portrayed by Tomasello (2008: 62) as the most fundamental type of human gesture. It is used to direct someone's attention to something in his/her immediate perceptual environment in order to communicate something to him/her. For instance, a man in a bar can point to his empty shot glass, conveying to the bartender the request 'Fill it up with liquor'. Or, someone can point to the protruding end of a pen in a companion's notebook, saying thereby 'Please be careful, don't let it drop out'.[11]

Being the second gestural means used for 'natural' communication, non-conventional iconic gestures go beyond simply directing attention to situations deictically. These gestures, Tomasello (2014: 60) asserts, actually symbolise an entity, action or situation. On the basis of observing such gestures, the recipient can '... imagine the real actions or objects the communicator is pantomiming, and then, in the context of their common ground, make the appropriate inference to his communicative intention'. For instance, the communicator can use an iconic gesture to warn someone of a nearby snake by moving his hand in a slithering way. Or, to give a second example of Tomasello's, the communicator can tell of a deer at the waterhole by miming antlers on his own head. With the appropriate common ground, Tomasello (2014: 60) asserts, iconic gestures '... communicate very effectively about all kinds of nonpresent situations'. According to him (2014:61), there are 'myriad possible iconic gestures – a "discrete infinity" perhaps'. Such gestures are, he (2014: 62) asserts, symbolic and have semantic content. Moreover, they can be combined in what he (2014: 66, 68) calls 'multiunit expressions'. One or more gestures are used to make contact with the common ground, typically to use it as a perspective or topic; one or more subsequent gestures to indicate what Tomasello (2014: 68) calls 'new and interesting information'.

The point of considering in broad outline Tomasello's account of how early hominins – he refers to *Homo heidelbergensis* – cooperatively communicated is not to claim that Neanderthal hunters used pointing and iconic gestures to communicate with one another. It is to flesh out the second doubt about the soundness of the inference that Neanderthals used language for such communication. To be able to make this inference, it has to be shown that these hunters were unable to communicate as effectively as they did with the aid of the simpler natural means of pointing and iconic gestures. A way of doing this would involve showing that specific bits of information which Neanderthal hunters communicated to one another are of a kind that cannot be communicated by means of such gestures. The soundness of inferential step F and, consequently, that of the hunting inference depends on succeeding in doing this.

To conclude, let us consider a possible instance of a doubt that may be harboured about the expressive power of a gestural communication system

such as the one under consideration. Would it have been possible for Neanderthal hunters to use pointing gestures and iconic gestures or mimes to convey information about displaced reference, i.e., about places other than the here, and times other than the now? Suppose that the leader of a band of hungry Neanderthal hunters wished to communicate the following message to other members of the band where they sat outside their cave: 'Tomorrow we go to the river to hunt reindeer'. In this message, 'tomorrow' refers to a time other than the now, and 'river' to a place other that the here. The leader could possibly have conveyed this message by using the following gestures in one of various orders:

- a gesture miming walking;
- a gesture meaning 'tomorrow' (resembling, for instance, gestures used by rudimentary or emerging new sign languages to mean 'tomorrow');
- a gesture miming flowing water;
- a pointing gesture indicating the location of the river concerned;
- a gesture with a spear miming hunting;
- a gesture miming on the leader's head the antlers of a reindeer.

The meaning of a sequence comprising these six gestures would have been narrowed down by the context in which they were used – that of planning a hunting trip in an area where the band hunted before.[12]

10.4 Conclusion

In terms of the findings of a study by Wissing et al. (2016: 327, 345), the diet of late Neanderthals in north-western Europe consisted by about 80% of large plant eaters such as mammoths and rhinoceroses.[13] Hunting big game was clearly one of the most important forms of behaviour in which these Neanderthals engaged: their very survival depended on doing this successfully. Moreover, hunting in the form of cooperative ambush hunting required Neanderthal hunters to engage in other advanced forms of behaviour, central to which was effective communicative interaction. Having been so central to their existence, cooperative hunting is clearly a form of behaviour that has the potential of shedding light on the question whether Neanderthals had language. This gives the hunting inference a special place among the inferences about Neanderthal language analysed in this book.

From the perspective of soundness, we have seen in the preceding section, the hunting inference has various commendable attributes. It is empirically well grounded in data about features of the ambush hunting performed by Neanderthals at various sites. Furthermore, the first two inferential steps taken in the hunting inference are clearly considered to be sound. As shown above, the weakness of this inference resides in the third and final inferential step.

It still needs to be underpinned by a bridge theory to warrant the following two arbitrary assumptions:

> *First assumption*: For communicating with one another, Neanderthal hunters needed a complex form of language such as the one attributed to them by Wynn and Coolidge (2012) instead of a less complex form such as linear grammar in the sense of Jackendoff and Wittenberg (2014, 2017).
>
> *Second assumption*: For communicating with one another, Neanderthal hunters needed a form of language instead of a simpler natural form of gestural communication such as that proposed by Tomasello (2008, 2014).

To build the required bridge theory, one would have to argue two points, among others. First: that a language that is simpler than the one proposed by Wynn and Coolidge (2012) lacks the means needed by Neanderthal hunters for communicating certain kinds of information. Second: that for communicating certain kinds of information shared by Neanderthal hunters, the means provided by a natural gestural system such as the one proposed by Tomasello are too weak.

Part IV

Implications

11 Dispersing the Murk

11.1 Retrospect

In preceding chapters the focus has been on inferences drawn about Neanderthal language from Neanderthal behaviours. Four of these behaviours were allegedly symbolic – making and wearing personal ornaments, producing cave art, beautifying bodies and burying the dead. Three behaviours were of a non-symbolic sort – making stone tools, teaching stone-tool making and hunting big game. Neither the inferences drawn about Neanderthal language from these symbolic behaviours nor those drawn from the non-symbolic behaviours concerned have been found to be unquestionably sound.

Neanderthals' making and wearing of personal ornaments, so-called jewellery, has been widely considered to provide the strongest evidence for the claim that they had language. But in Chapter 4 the soundness of the jewellery inference drawn from this alleged form of symbolic behaviour was found to be dubious. The question of whether Neanderthals behaved symbolically will remain an open one as long as it pursued within the framework of the impoverished conceptual framework – The Received Framework – that has been widely adopted. Even if it could be soundly inferred that at least some Neanderthals did behave symbolically, the most important doubt about the soundness of the language inference – analysed in Chapter 7 – remains to be resolved. Recall that this inference starts from the conclusion that some Neanderthals engaged in symbolic behaviour and arrives at the further conclusion that they had language. The inferential step from the cultural symbols to linguistic signs lacks a warrant.

From a linguistic perspective, Neanderthals' cooperative hunting of big game potentially represents the most informative form of non-symbolic behaviour in which they engaged. However, drawn from data about this hunting behaviour, the hunting inference was found in Chapter 10 to include an inferential step of dubious soundness. This step, we have seen, proceeds from Neanderthal hunters' communication about hunting sites, strategies and actions to their having had complex language. But this inferential step has been found to be unwarranted, since it has not been ruled out that a restricted

form of language or a system of natural gestures could have been an adequate means of communication for Neanderthal ambush hunters.

All in all, then, the soundness of the most important inferences yielding the conclusion that some Neanderthals had language fail to withstand close scrutiny. The doubts about the soundness of the jewellery inference, the language inference and the hunting inference may yet be resolved by further work. At present, though, the findings made in preceding chapters show the Neanderthal behaviours at issue to have clear limitations as windows on Neanderthal language. It is important, however, to be clear about what is *not* implied by these findings. The following, among others:

Three Non-Implications

(a) Neanderthals did not have language.
(b) Biological attributes of Neanderthals provide better windows on Neanderthal language than behaviours.
(c) Much of what has been controversially claimed about Neanderthal language is rooted in a lack of uncontentious evidence.

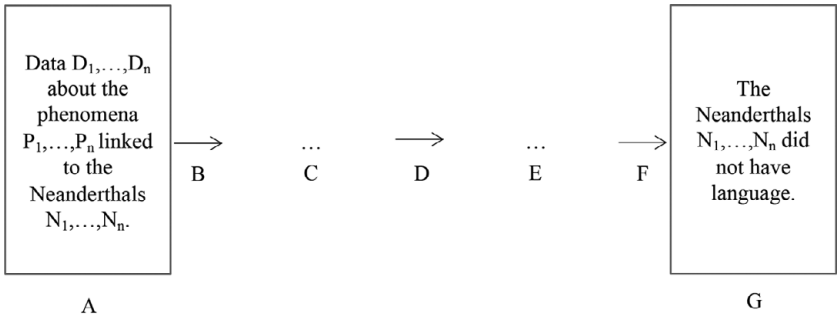
So, let us consider the reasons why (a)–(c) do not follow from the findings of preceding chapters.

11.2 The No-Language Inference

The conclusions of unsound inferences about the existence of Neanderthal language wrongly attribute language to the Neanderthals concerned. From the fact that such conclusions are wrong, however, it does not follow that these Neanderthals did not have language. How, then, should a claim asserting that Neanderthals *did not* have language be justified? In the same way as a claim asserting that they *did* have language: by inferring it from relevant facts. Such inferences would have the skeletal make-up shown in Figure 11.1.

The data $D_1,\ldots, D_n$ referred to in box A may, for instance, be neuroanatomical data about the Neanderthals $N_1,\ldots,N_n$, indicating that their brains were unable to support a cognitive system resembling in essential ways language as we know it. Instances of the no-language inference, however, are hard to find in the literature. Claims asserting that Neanderthals did not have language are rather grounded in negative considerations. More specifically, in alleged flaws of inferences ending with the conclusion that Neanderthals did have language. Some instances can illuminate this point.

Ian Tattersall, a leading palaeoanthropologist, has claimed that Neanderthals did not have language (as we know it). The justification that he (2017: 65) has recently provided for this claim boils down to his judgement that 'the large literature [that] suggests that Neanderthals possessed language' is mistaken in



[where arrows B, D and F represent inferential steps, and the dots C and E represent (possible) intermediate conclusions]

Figure 11.1 The no-language inference

doing this. That is, these suggestions are not supported by evidence that Neanderthals behaved symbolically. Thus, Tattersall reasons as follows:

> the archaeological evidence cited in defense of this position typically cites examples of nonsymbolic complexities of behaviour already referred to. In a long and remarkably comprehensive record, there is little to suggest that Neanderthals routinely perceived and reworked the world in their minds in the specific [symbolic – R.B.] way we do today. (Tattersall 2017: 65)[1]

Tattersall's reasoning is pertinent in a second way as well. It shows that, like the authors criticised by him, he assumes the following: if Neanderthals behaved symbolically, it can be inferred that they had language. In Section 7.4, however, it is shown that this assumption is a dubious one. As such, it cannot serve as a warrant for the inference concerned. Tattersall (2017: 64) also holds the view that 'symbolic thought of the uniquely human kind' is the best proxy for language. If this is so, the best proxy for language would be a rather weak one.

For a second instance of the point under discussion, consider Berwick and Chomsky's view that, in all likelihood, Neanderthals did not have language that resembled modern language in essential ways. They argue this view in a negative way, maintaining that there is a lack of uncontentious evidence for the 'radical conclusion' that Neanderthals had the basic property or symbolic language. Thus, they conclude that:

> Given the contentious debate over the evidence, our view is that there is no reason at present to move to the more radical conclusion that Neandertals possessed anything like the Basic Property or even the rudiments of symbolic language. (Berwick and Chomsky 2016: 154)

This conclusion flows from Berwick and Chomsky's appraisal of various kinds of evidence that have been adduced in support of the claim that Neanderthals had language. For instance, about evidence derived from possible proxies for language, they remark in line with Tattersall (2010) that:

> If we turn to possible proxies for language, the situation is even muddier. It is merely assertion that complex stone working, fire control, clothing, ochre, and the like require language. (Berwick and Chomsky 2016:153)

The evidence that has been gleaned from burials is not rated highly by them either:

> One can read the 'burial' evidence any way one wants. There is nothing that can convincingly be characterized as Neandertal 'grave goods'. (Berwick and Chomsky 2016:153)

To give one more example: Berwick and Chomsky (2016: 153) also dismiss the claim that pendants recovered at Grotte du Renne provide evidence for 'symbolic activity' by Neanderthal inhabitants of the cave. In support of this dismissal, they cite, amongst others, judgements by Higham et al. (2011) and Mellars (2010) in terms of which the pendants concerned should not be attributed to the Neanderthals who inhabited the cave. These judgements, however, are in all likelihood wrong, as has been shown in Section 3.3.1. Berwick and Chomsky's appraisal of some of the other kinds of evidence dismissed by them may be questionable too.[2] This, however, is not the point here. The point, rather, is that the claim that Neanderthals did not have language does not follow from criticisms of behavioural evidence provided in support of the claim that Neanderthals did have language.[3]

11.3 Inferences from Biological Attributes

11.3.1 Genes and Brains

This book focuses on inferences about Neanderthal language that have been drawn from behaviours in which these early humans are believed to have engaged. The literature, however, contains a range of inferences about Neanderthal language drawn from non-behavioural phenomena.[4] Central among these, are inferences drawn from (i) the occurrence of the gene *FOXP2* in the genome of modern humans and in that of Neanderthals and (ii) structural correspondences between modern human and Neanderthal brains. Here I am concerned from a comparative perspective with two of these inferences: to determine whether they are less contentious in regard to soundness than the inferences from the behaviours examined in Chapters 3–10.

11.3.2 The *FOXP2* Inference

Turning first to *FOXP2,* expressed in various areas of the brain (Enard et al. 2002: 869), this gene is believed to be required in modern humans for the proper development of the neural mechanisms underlying speech and language (Lai et al. 2001: 519).[5] Mutations in *FOXP2* have been found to cause severe speech and language disorders (Enard et al. 2002: 869, 871; Lai et al. 2001: 519; MacDermot et al. 2005: 1074–75; Marcus and Fisher 2003: 2). Instances of disorders attributable to a mutation in *FOXP2* are found in half of the members of the first three generations of a British family, referred to as the 'KE family'. Their production as well as comprehension of speech are affected. Thus, they have difficulty in articulating, causing their speech to be almost unintelligible. In addition, they have difficulty in processing inflectional and derivational forms, in understanding sentences with complex structures, in distinguishing words from non-words, and in reading and spelling non-words (Gopnik and Crago 1991; MacDermot et al. 2005: 1074; Marcus and Fisher: 2003: 2; Watkins: 2002: 458ff.). On account of its role in such speech and language disorders, *FOXP2* has been dubbed 'the language gene'.[6]

But how does *FOXP2* bear on the question whether Neanderthals had language? The findings of three studies of the evolution of *FOXP2* are crucial to understanding the link. In the first, Enard et al. (2002: 869) found that the human *FOXP2* gene differs from the one found in non-human primates and other animals: it acquired two amino-acid changes in the human lineage. This strongly suggested to them (2002: 869) that '. . . this gene has been the target of selection during recent human evolution'. That is, Enard et al. (2002) found evidence for both accelerated evolution on the hominin lineage and a recent sweep in *FOXP2* (Atkinson et al. 2018:1). Since these changes gave humans a big evolutionary advantage, they have been quickly adopted across the species. That is, the two amino-acid changes in *FOXP2* spread quickly to all humans. This has led scholars to conclude that these changes in *FOXP2* were associated with the relatively sudden recent emergence of speech and language (Atkinson et al. 2018: 1424, 1432; Enard et al. 2002: 871; Zhang et al. 2002: 1825, 1831).

Turning to the second study, conducted by Krause et al. (2007: 1908), it found that the two changes in the *FOXP2* variant of modern humans were shared with late Neanderthals who occupied El Sidrón Cave in Asturias in the north of Spain. More specifically, Krause et al. (2007: 1909) found that chromosomes extracted from bones of two El Sidrón Neanderthals exhibit the two amino-acid changes that occurred, according to Enard et al. in the modern human variant of *FOXP2*. Krause et al. (2007: 1911) concluded that '[w]hatever function the two amino acid substitutions might have for human language ability, it was present not only in modern humans but also in late Neandertals.'[7]

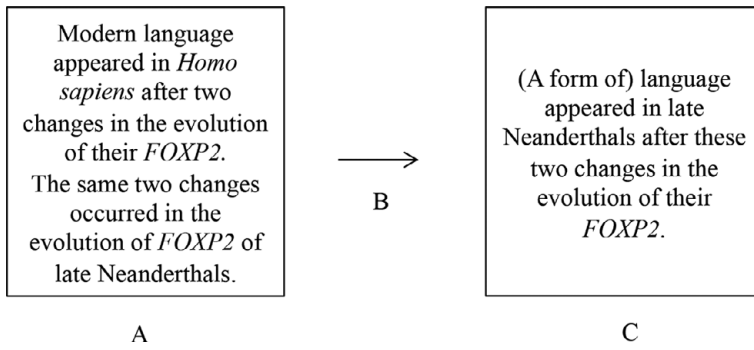


Figure 11.2 The *FOXP2* inference

This conclusion by Krause et al. was bad news for some scholars and good news for others. Bad news for those who took Enard et al.'s (2002) findings to indicate that modern language emerged relatively late – after the split between modern humans and Neanderthals – and relatively fast. Good news for scholars looking for evidence that Neanderthals had language. Thus, as Progovac, among others, has observed :

> if one was comfortable using FOXP2 gene to advance saltationist claims prior to the findings in 2007 [by Krause et al. 2007 – R.B.], then one should now certainly be open to the possibility that Neandertals had some form of language, and by extension also our common ancestor. (Progovac 2016: 2)

The inference drawn by the scholars concerned has roughly the form depicted in Figure 11.2.

Underlying this inference, is the assumption 'if modern language is associated with *FOXP2* in *Homo sapiens*, then a form of language akin to modern language is associated with a similarly changed variant of *FOXP2* in late Neanderthals'. Stripped to the essence, the conclusion in box C of Figure 11.2 simply says 'Neanderthals had (a form of) language (akin to modern language)'.

In support of the hypothesis that Neanderthals had (a form of) language, scholars in various areas have subscribed to the *FOXP2* inference. Some has done this in a more qualified way than others, as the following quotations show:

> Potentially relevant for language and speech, they [i.e., the Neandertal, Denisovan and modern human genomes – R.B.] share for example the same 'human specific' two amino-acid substitutions in *FOXP2* (Krause et al. 2007), the best-known gene hitherto linked to language, lending support to our hypothesis that Neandertals were language users (Trinkaus, 2007). (Dediu and Levinson 2013: 4)[8]

Another perspective on this issue is the discovery of the *FOXP2* gene sequence in two male Asturian Neandertals dated about 40,000 years ago (Krause et al. 2007; de Torres et al. 2010). This gene, strongly implicated in speech and language development ... shows no difference between Neandertals and moderns, indicating that at least this genetic component of normal language development was present in Neandertals. (Frayer et al. 2010: 122–23)

It has been found that the gene [referred to as 'FOXP2' by the authors – R.B.], which is not a language gene but vital for language, will not allow language to function if it is disabled by mutation. Recovery of the Neanderthal genome has demonstrated that they too had the modern version of FOXP2. (Gamble et al. 2014: 142)

The presence of human FOXP2 [sic] in Neanderthals is by no means incontrovertible proof that Neanderthals had complex language (cf. Benítez-Burraco & Longa 2012), but it does add some additional weight to the case for Neanderthal language. (Johansson 2013a: 49)

To whatever extent the *FOXP2* changes affected language evolution, this observation [that the derived human-specific allele of *FOXP2* has been found in Neanderthals and Denisovans – R.B.] supports Neanderthal (and Denisovan) language. (Johansson 2015: 320)

And we also know from ... the evidence that Neanderthals had the same FOXP2 [sic] gene for speech as we do, that Neanderthals almost certainly had spoken language, although it is debateable whether their speech was as complex as ours. (Papagianni and Morse 2015: 193-194)

Neandertals had speech. Their expanded Broca's area in the brain and their possession of a human FOXP2 [sic] gene both suggest this. Wynn and Coolidge (2012: 131)[9]

The *FOXP2* inference, however, is unsound. To see why, we have to consider the findings of the third study mentioned above. In this recent study, Atkinson et al. (2018: 1) re-examined the history of *FOXP2*, using a larger data set and more diverse population. They (2018: 6) found no evidence for a selective sweep at *FOXP2* in the time frame relevant for language evolution at *FOXP2*. In their phrasing:

we do not find evidence that the *FOXP2* locus or any previously implicated site within *FOXP2* is associated with recent positive selection in humans. Specifically, we demonstrate that there is no evidence that the original two amino-acid substitutions were targeted by a recent sweep limited to modern humans <200 kya as suggested by Enard et al. (2002). (Atkinson et al. 2018: 9)

Atkinson et al. (2018: 9) do not dispute the extensive functional evidence supporting *FOXP2*'s important role in the neurological processes related to language production. They show, however, that recent natural selection in the ancestral *Homo sapiens* population cannot be attributed to the *FOXP2* locus and thus *Homo sapiens*' development of spoken language. The original signal that looked to Enard et al. (2002) like a selective sweep was, in Atkinson

et al.'s (2018: 1, 3) view 'due to sample composition' (p. 1), specifically, '... the inclusion of predominantly but not entirely individuals of Eurasian descent' (p. 3). That is, Enard et al.'s evidence, according to Atkinson et al.'s reanalysis, is a statistical artefact.

Atkinson et al.'s (2018) findings have radical implications. To begin with, these findings destroy the grounding of the *FOXP2* inference. The claim – in box A of Figure 11.2 – that modern language appeared in *Homo sapiens* after two changes occurred in the evolution of their *FOXP2* is wrong. This makes this inference an unsound one. The alleged causal link between the changes in modern human *FOXP2* and the emergence of modern language simply does not exist, given Atkinson et al.'s findings.

But Atkinson et al.'s findings have an even more far-reaching implication. *FOXP2* has enjoyed a special status in work on the evolution of language. It has been judged to offer the best genetic window on the evolution of speech and language. And Atkinson et al.'s findings have shut this window, at least for now. It is not clear what, if anything, can be soundly inferred about language evolution from what is currently known about so-called language-implicated genes.[10]

11.3.3 The Brain Inference

It has been suggested that the presence of language in (some) Neanderthals can be inferred from the structure of their brains. Thus, in Section 2.1, Frayer et al. (2010: 122) were seen to infer from their conclusion that European Neanderthals brains were left-lateralised like those of living humans that these Neanderthals had linguistic capacities similar to these humans. Furthermore, in Section 11.3.2, it was noted that Wynn and Coolidge (2012: 131) are of the view that the expanded Broca's area in Neanderthals' brains suggests, along with the presence of *FOXP2*, that Neanderthals had speech – speech not explicitly distinguished from language. Some scholars adopt a conservative view of the strength of the link between Neanderthals' neuroanatomy and their putative linguistic attributes. Thus, according to Gamble et al.:

> The recognition of development in Broca's area and Wernicke's area ... suggests that language had beginnings as far back as early *Homo*. Even so the position is much less certain than for handedness – and handedness itself need not necessarily indicate the presence of language. (Gamble et al. 2014: 140)

Johansson (2013a: 48) is equally cautious in asserting that '[w]hat little we know about Neanderthal brains is at least consistent with the presence of language, but the support is quite weak', and in remarking that 'strong conclusions' about Neanderthal language cannot be drawn from features of Neanderthal brains (Johansson 2015: 318–19).

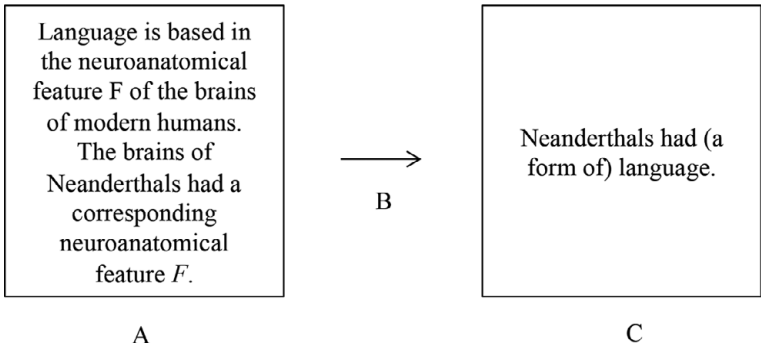


Figure 11.3 The brain inference

There are good reasons for not drawing strong conclusions about the presence of language in Neanderthals from features attributed to their brains. The prototypical inference concerned, the brain inference, starts from (i) data about the association of language with a feature, F, of the brains of modern humans and (ii) the assumption that the brains of Neanderthals had a corresponding feature, *F*. The features F and *F* are left-lateralisation in the case of Frayer et al. (2010), and Broca's area in the case of Wynn and Coolidge (2012). With the aid of a single inferential step, the conclusion is drawn that Neanderthals had (a form of) language. The (implicit) warrant of this inferential step reads roughly as follows: 'If language is associated with a particular feature of the brains of modern humans, then (a form of) language was associated with the corresponding feature of Neanderthal brains'. The logical structure of the brain inference is shown in Figure 11.3.

There are various concerns about the soundness of the brain inference. A first has already been set out in Section 2.4.3. It springs from the incorrect assumption that language is localised in a single neuroanatomical feature such as left-laterilisation or Broca's area. As observed by Wilkins (2007: 476), by Benítez-Burraco and Longa (2012: 188–89) and by others, language is widely distributed in the brain of modern humans. Along with Broca's area and Wernicke's area, neuroanatomical structures such as the caudate nucleus, basal ganglia and cerebellum have also been found to be involved in the processing of language. This has an important implication if the form of language attributed to Neanderthals were taken to be in essential ways similar to that of modern human language. That is, it would have to be shown that, for processing language, Neanderthal brains also used structures corresponding to the latter structures. Left-lateralisation or Broca's area alone would not have been sufficient for this processing.

A second concern about the soundness of the brain inference arises from the assumption that features of Neanderthal brains and corresponding features of human brains are highly similar. This assumption, however, has been shown to be unfounded. Consider in this regard again Wynn et al.'s (2016: 203–06) overview of ways in which brain structures of Anatomically Modern Humans and allegedly corresponding brain structures of Neanderthals have been found to differ. As noted in Section 8.3, various of these differences concern structures claimed to implicate language. For instance, Anatomically Modern Humans had: (i) larger frontal and temporal poles than Neanderthals; (ii) Anatomically Modern Humans had a wider orbitofrontal cortex than Neanderthals; and (iii) Anatomically Modern Humans had a proportionally larger cerebellum than Neanderthals. The latter difference has been confirmed by recent work. Thus, reconstructing the Neanderthal brain with the use of computational anatomy, Kochiyama et al. (2018: 1) have found that early *Homo sapiens* had relatively larger cerebellar hemispheres than Neanderthals. This finding is significant here, since in the view of Kochiyama et al.:

> As the cerebellar hemisphere contains many of these modules[37] [i.e., complex neuronal networks – R.B.], a larger cerebellar volume is directly correlated with larger number [sic] of the modules, and therefore with higher language processing and larger working memory capacity.[11] (Kochiyama et al. 2018: 3–4)

They go on to assert that:

> Our finding of laterality in terms of the relatively small right cerebellar hemisphere of NT [i.e., Neanderthals – R.B.] indicates minimal connection to the left prefrontal regions, which has one of the major role [sic] in language processing[38], potentially causing disparity of language between NT and *Homo sapiens*.[12] (Kochiyama et al. 2018: 5)

How, then, do such differences between structures in the brains of modern humans and structures in the brains of Neanderthals bear on the soundness of the brain inference? To make this inference, it is clearly not sufficient to simply cite correspondences between modern human and Neanderthal brain structures. It needs to be shown that the differences between the former and the latter structures are not too big. If they were too big, the Neanderthal brain structures would in all likelihood not be capable of supporting the linguistic functions concerned, which would bear negatively on the soundness of the brain inference.[13]

The third concern about the soundness of the brain inference springs from the finding that Broca's area is a multifunctional structure in the brains of modern humans (Grodzinsky and Santi 2008: 475). Thus, this structure has been found to support the following neural processes:[14]

Functions of Broca's Area in Modern Human Brains

(a) Language processing: production and comprehension (e.g., Grodzinsky and Santi 2008: 475; Skipper et al. 2007: 261).
(b) Processing speech-associated actions, i.e., hand movements – distinct from pantomime and sign language – that co-occur with speech (Skipper et al. 2007: 260, 262ff.)
(c) Working memory (Grodzinsky and Santi 2008: 476, 479; Wager and Smith 2003).
(d) Observing, recognising, interpreting, imitating and producing non-linguistic actions (Fadiga et al. 2006: 77; Grodzinsky and Santi 2008: 475–76; Skipper et al. 2007: 262; Nishitani et al. 2005: 62ff.).

Language processing in the form of speech production and comprehension is considered the 'classical' function of Broca's area. The roles played by this area in supporting the processing of speech-associated actions and working memory are considered to be its 'language-associated' functions. The fourth function – supporting non-linguistic action – is the interesting one from the perspective of the present section. As regards this function, Nishitani et al. (2005) observe that:

> Far beyond its classical language functions, Broca's region contributes to action planning, action observation, action understanding, and imitation. (Nishitani et al. 2005: 66)

In similar vein, Fadiga et al. (2006) remark that they:

> . . . have taken a step forward, empirically showing for the first time that human Broca's area is not an exclusive 'speech' center but, most probably, a motor assembly center in which communicative gestures, whether linguistic or otherwise, are assembled and decoded. (Fadiga et al. 2006: 87–88)

Skipper et al. (2007) agree with this view, referring in addition to work by Nishitani et al. (2005) and Rizzolatti and Craighero (2004) as well:

> In addition to these language functions, both the PTr [i.e., the pars triangularis of the inferior frontal gyrus – R.B.] and Pop [i.e., the pars opercularis of the inferior frontal gyrus – R.B.] have been proposed to play a fundamental role in the recognition, imitation, and production of actions (for review see Nishitani et al. 2005; Rizzolatti & Craighero, 2004). (Skipper et al. 2007: 262)

This function of Broca's area is illustrated by a particular category of gestures used by Fadiga et al. (2006: 77, 78) in an experimental study: hand shadows resembling moving animals. According to Fadiga et al. (2006: 77), their study provides fMRI evidence for the involvement of Broca's area. They (2006: 78), moreover, refer to a range of other studies that have provided experimental evidence showing that Broca's area and its homologue in the right hemisphere

also become active during the observation of hand/mouth actions performed by other individuals.

This brings us to the significance of the finding that Broca's area plays a role also in supporting the processing of non-linguistic actions by modern humans. The question is whether it played this role in the case of Neanderthals as well, and, if it did, whether it wasn't its only function. For the brain inference to be sound, this possibility needs to be ruled out. This has not been done yet.[15]

11.3.4 Conclusions

In sum, sound inferences about Neanderthal language have still to be drawn from Neanderthal genes and Neanderthal brains, two biological attributes that are considered potentially informative. To be able to draw such inferences, formidable obstacles would have to be overcome in the case of both genes and brains. In the case of genes a formidable impediment is the lack of knowledge of the role of genes in the development and evolution of modern language. In the case of brains, it is a lack of knowledge of whether Neanderthal brains correspond sufficiently closely to modern human brains in regard to language-implicated structures and their functions.

11.4 The Primacy of Warrants

Why has so much of what has been claimed about Neanderthal language been so controversial? That is, why has the matter of the existence and properties of Neanderthal language been covered by murk for so long? A reason suggesting itself immediately is that there is a lack of uncontentious evidence about the existence and properties of Neanderthal language. Thus, in the view of Berwick and Chomsky (2016: 154) 'the contentious debate over the evidence' is the reason for their not drawing the conclusion that Neanderthals had anything like the basic property or even the rudiments of symbolic language.

It is indeed so that contentious evidence has been at the heart of the debates that rage about Neanderthal language, but the contentious nature of this evidence is not the root cause of the controversies concerned. It is only symptomatic of a deeper lying ailment. This ailment, preceding chapters have shown, takes the form of an impoverished conceptual framework adopted in much of the work on Neanderthal language. As for logic, this framework is wanting in not providing for appropriate conditions on the soundness of inferences drawn about Neanderthal language. Crucially, it lacks the condition requiring inferential steps to be justified by appropriate warrants underpinned by bridge theories. Unwarranted inferential steps are arbitrary, hence contentious by their very nature. The framework adopted by many, moreover, does

not include a principled linguistic ontology, resulting in claims about a nebulous entity called 'Neanderthal language'.

Two of the warrants needed for drawing inferences about Neanderthal language from behaviours are of critical importance. The first is needed for justifying inferential step F of the language inference discussed in Chapter 7. This is the step from Neanderthal cultural symbols – assuming that they had such symbols – to the linguistic signs attributed to Neanderthal language. This warrant needs to be a component of all the inferences – the jewellery inference, the various cave-art inferences, the body-decoration inference and the deliberate burial inference – which starts from the claim that Neanderthals behaved symbolically and ends with the conclusion that they had language. This warrant derives its importance from the widely shared view that the alleged symbolic behaviours of Neanderthals provide the best indication that they had a capacity for language. Underpinned by a bridge theory of the way in which cultural symbols and linguistic signs hang together, this warrant is yet to be provided.

The second important warrant is needed to justify the inferential step by which it is inferred from non-symbolic behaviours of Neanderthals that the language attributed to them had specific grammatical properties. In the case of the hunting inference discussed in Chapter 10, the grammatical properties included a large lexicon, lexical categories (parts of speech), possibly morphological and syntactic rules, various types of sentences and so on. As noted in Chapter 7, some scholars have gone even further, claiming that Neanderthal language was grammatically (almost) as complex as modern human language.[16]

What, then, would a warrant have to say to justify the attribution of particular grammatical properties to Neanderthal language, assuming that it existed? Consider this question from the perspective of the basic reason why grammatical properties – for instance, a particular kind of syntactic structure, associated types of syntactic phrases, lexical categories such as nouns and verbs, and the like – are assigned to modern languages. It is to explain why utterances of these languages are judged to have particular properties: why they are (not) acceptable, why they are (not) understood in a particular way, why they (don't) have the same meaning or different meanings, why they are (not) ambiguous and so on (Botha 1981: 34, 59). Linguistic utterances and judgements about their properties represent the so-called primary linguistic data in the analysis of modern languages. As has often been observed, however, there are no such data about Neanderthal language. This gives rise to the question about the rationale for assigning grammatical properties to Neanderthal language. That is: for the explanation of what should particular grammatical properties be assigned to Neanderthal language? This is what the warrant under consideration needs to state.

For instance, that Neanderthals needed a language with particular grammatical properties to be able to convey to one another certain bits of information, instructions, questions and so on when they hunted cooperatively. Developing this general idea into an empirical account would require much in the way of precision: precision, amongst other things, about the contents of what Neanderthals communicated to each other, and about why particular kinds of content could not have been conveyed without the aid of specific grammatical properties. The lesson of Riau Indonesian and restricted modern linguistic systems is that complex ideas can be communicated with the aid of relatively simple grammatical means.

In sum, it is undeniably so that uncontentious evidence is needed if progress is to be made in pursuing questions about Neanderthal language. But to obtain such evidence, something more fundamental has to be done: providing appropriate warrants for inferences drawn about Neanderthal language from data about their behaviour and biology. In the absence of such warrants, data about these phenomena will remain just that: data about these phenomena.[17] For these data to acquire the status of evidence about Neanderthal language an inferential bridge between these phenomena and Neanderthal language is needed – a bridge formed by appropriate warrants. Just pointing to such phenomena and stipulating or assuming that data about them constitute evidence for or against claims about Neanderthal language won't do: it would represent an arbitrary stratagem. Furthermore, it would be similarly arbitrary to accord the status of 'indirect evidence' to data linked to Neanderthal language by way of inferential steps that are not licenced by appropriate warrants. As would be, stating that data about various 'other' phenomena provide 'comprehensive' or 'converging' 'indirect evidence' for or against claims about the existence or make-up of Neanderthal language. Finally, data that are not linked by an appropriate warrant to a claim about Neanderthal language cannot contribute in some mysterious way to the probability of this claim. Appropriate warrants are the means of combatting this arbitrariness and the controversies fuelled by it.

11.5 The Nature of the Beast

Is it possible, then, to say something uncontentious in answer to the questions of whether Neanderthals had language and, if they did, what it was like? At present, very little indeed. It is clear, though, that claims about Neanderthal language should take the form of conclusions of inferences that are empirically grounded and warranted. As for grounding, these inferences need to be based on what is reliably known about Neanderthals' behaviours and biology. Drawing a distinction between a communication system and language, the following two pieces of knowledge are relevant in this regard:

Neanderthals' Communication System

(a) Neanderthals engaged in a range of complex behaviours that required a sufficiently sophisticated communication system.
(b) The means employed by this communication system had to be supported by brain structures of Neanderthals, which were smaller in size or volume than those of modern humans.

Neanderthals' hunting behaviour can serve to illustrate (a). Recall that, as observed by Wynn and Coolidge (2012) and others, to have been able to successfully hunt big game, Neanderthals had to communicate with one another about locations of removed ambush sites, about events that took place during past hunts, about planned future actions to be taken when collectively confronting prey, about hunting strategies and so on. To be able to convey information and thoughts about matters such as these, the communication system used by Neanderthal hunters had to provide means that allowed them to refer to places other than the here and to times other than the now. From this it may be inferred that these means included basic referential elements resembling arbitrary Saussurean linguistic signs.[18] This conclusion is licenced by the following warrant:

Warrant: Use of Sign-like Basic Referential Elements

For communicating about objects and events removed in space and time, basic referential elements resembling arbitrary Saussurean linguistic signs are needed.[19]

What the substance of the signal component (the 'signifier') of these referential elements involved cannot be inferred with confidence from what is known about the behaviour of Neanderthal hunters. If they communicated with one another while acting frenetically in killing prey, sound would probably have been more functional than gesture, hunters using their hands and arms to wield their spears.

Turning to (b), recall that in preceding sections it has been noted that the brains of Neanderthals differed from those of modern humans in linguistically significant ways. Thus, structures that support language processing in modern human brains have counterparts in Neanderthal brains that are smaller in size or volume. For instance, as noted in Sections 10.2 and 11.3.3, Anatomically Modern Humans had larger frontal and temporal poles, a wider orbitofrontal cortex and a bigger cerebellum. From these differences, it may be inferred that the communication system of Neanderthals differed from modern language in not employing complex grammatical means for structuring sequences of basic elements. This inference is licenced by the following, second, warrant:

Warrant: Lack of Grammatical Complexity

Complex grammatical properties such as those used by modern language require support by brain structures that are as big in size or volume as those of modern humans.

This warrant obviously does not imply that Neanderthal hunters were unable to string referential elements together to form simple sequences.[20] Recall in this regard that speakers of Riau Indonesian and users of restricted linguistic systems are able to communicate complex messages with the aid of relatively simple grammatical means. It is unclear whether Neanderthal brains would have been able to support a grammatically simpler form of modern language such as Riau Indonesian or restricted linguistic systems such as incipient pidgins, homesign, or the Basic Variety. After all, speakers of Riau Indonesian and users of restricted linguistic systems have modern brains and a modern language faculty.

Let us, in conclusion, return to the questions 'Did Neanderthals have language?' and 'If they did, what was it like?' Inferred from what is known about the hunting behaviour of Neanderthals, the conservative answers read as follows:

Neanderthal Language

(a) Neanderthals had a form of language with basic units resembling arbitrary linguistic signs.
(b) This form of language was supported by brain structures smaller in size or volume than those of modern humans, and, consequently, lacked the complex grammatical properties of full modern language.[21]

How credible, then, are these answers? Two considerations count in their favour. First, they are empirically justified. Thus, these answers represent conclusions of inferences which are grounded in (i) what is believed to be known about Neanderthal hunters' communicative behaviour, more specifically about the topics about which they communicated and (ii) what is known about their brain structures that could have supported their language. Second, the inferences concerned are licenced by two warrants, both of which appear to be uncontroversial.

Conservative as it is, the characterisation of the nature of Neanderthal language given above is, nevertheless, not uncontentious. First, what is currently believed to be reliably known about (i) the topics about which Neanderthal hunters communicated and (ii) what they actually conveyed to one another about these topics may be speculative. If this is so, the factual grounding of the inference yielding the conclusions (a) and (b) would be wanting. Even if this grounding were adequate, these conclusions may not fully reflect the nature of Neanderthals' linguistic capacity, having been drawn from only one of the forms of behaviour in which they engaged. There may be as yet poorly understood Neanderthal behaviours from which richer linguistic inferences can be drawn, once these behaviours have been unravelled. Second, a system of natural gestures may require

support by brain structures that are even smaller in size or volume than those required for the limited form of language attributed above to Neanderthal hunters. So, the possibility that Neanderthal hunters used such a gestural system for communicating with one another still needs to be ruled out. This represents the inevitable twist in a tale about Neanderthal language.

Notes

Chapter 1 Pursuing an Intriguing but Murky Matter

1 Cf. Hale (1886: 30–31) for this translation. More fully, anatomists refer to the bumps or small bony projections that are absent from the Naulette lower jawbone as 'mandibular genial tubercles' (Radick 2007: 179). In Hale's translation, 'Chell**c**an man' should possibly be 'Chill**e**an man', which is an archaic expression roughly meaning 'man of the old stone age'.

2 Boule's reconstruction of The Old Man's skeleton is claimed to be erroneous in a number of ways. Cf. Straus and Cave (1957) and Trinkaus (1985) for criticisms of Boule's reconstruction. In essence, Boule mistook pathological, arthritic malformations in the skeleton as normal anatomical features of Neanderthals. For an image of the reconstructed skeleton, see Image 6.1 on p. 89.

3 Though disagreeing on specifics, present-day scientists who work within different theoretical frameworks agree on the whole that Neanderthals had advanced behavioural and cognitive capabilities. Thus Straus (2009: 6–7) observes in general terms that '[i]n contrast to the older view of Neandertals as unchanging, inflexible, reactive, robot-like beings, who habitually made a miserable living from simple hunting and/or scavenging with minimal technological assistance, and scant ability for anything beyond the immediate and most practical needs of survival, current research is increasingly finding evidence of Neandertal abilities and capacity for change (see for example Clark 1997, 2007; Hovers and Belfer-Cohen 2005; Zilhão 2001, 2006b)'. In more specific terms, Roebroeks and Soressi (2016: 6376), find important similarities between the archaeological records of Neanderthals and their African *near*-modern human contemporaries: '. . . it is also a fact that the archeological records of Neanderthals and their African near-modern human contemporaries are very similar in terms of what were once thought to be standard markers of modern cognitive and behavioral capacities, such as diversity of subsistence strategies and diet, use of minerals, use and transport of lithics, shells, personal ornaments, and hafting, and pyrotechnology.' Peresani et al. (2014: 233), likewise, observe that in the last two decades scientists have found 'evidence of a diverse nature' that '. . .has demonstrated that Neanderthals manifested at different moments behaviors not ascribable to the utilitarian sphere, but to the aesthetic or symbolic'. And to give a final instance, Tattersall (2017: 65) is of the opinion that early hominids, including Neanderthals, behaved in complex ways and 'were clearly extremely complex in cognition'. See Zilhão (2011: 115–16) for a critical account of the reasons why Neanderthals endured,

from the mid-nineteenth to the mid-twentieth century, a 'bad reputation' as creatures that were 'part-ape/part-man'.

4 Direct evidence is evidence contained in natural records such as the fossil record or in man-made records produced by some system of recording, writing being one.

5 Cf. Botha (2016) for a detailed account of what the Windows Approach involves.

6 Cf. Botha (2016: 4) for this characterisation of a window on language evolution, Botha (2016: 4–8) for an illustrative sample of the windows used in the study of language evolution and Botha (2016: 8–11) for further clarification of the concepts of 'window', 'language' and 'evolution'.

7 A first category includes putative windows allowing such inferences to be drawn from data about various features of Neanderthals, including their:

(a) Skeletal anatomy: teeth, hyoid bone, ear bones (ossicles), larynx.
(b) Behaviours: hunting behaviour, toolmaking behaviour, social behaviour, symbolic behaviour including religious/ritual behaviour, other forms of complex behaviour including weapon making, use of fire, utilisation of living sites.
(c) Cognition: styles of thinking, complexity of cognition, computational capacity, intentionality.
(d) Neurology: brain size, brain structure, neural connections.
(e) Genes: language/speech-implicated genes, interbreeding with modern humans.

Putative windows belonging to a second category are based on properties of modern human language as such and individual languages as instantiations of it, as these are depicted by linguistic theories. These include:

(a) Defining properties of modern language: recursion, symbolism, displaced reference (i.e., reference not to the here and now).
(b) Properties of modern languages: structure, variation, use etc.

As used above, the qualification 'putative' is important. That is, scholars disagree strongly about which of the listed windows, if any, make it possible to draw sound inferences about Neanderthal language and/or speech. See in this regard Balari et al. (2013), Berwick et al. (2013), Dediu and Levinson (2013) and Johansson (2013a, 2015) for diverging appraisals of various kinds of windows claimed to provide indirect evidence about Neanderthal language. I return to this point in Chapter 11.

8 To clear up an orthographical matter: In this book, I write the term *Neanderthal* with an *h,* except when I quote authors who use the *h*-less spelling.

Chapter 2 Telltale Neanderthal Teeth

1 Cf. Frayer et al. (2010: 113). This claim is implicit in Frayer et al. (2012: 63–64) and Volpato et al. (2012: 4–5) as well.

2 The literature contains discussions of the scratched-teeth inference in which the first and the second step are collapsed by some, as are the third and the fourth. I will take up this point again in Section 2.4. Frayer et al. are not the only scientists who have inferred via the alleged right-handedness and left-lateralisation of Neanderthals that they had language or language ability. Similar inferences have been drawn by others, including those mentioned by Uomini (2011:151).

3 Cf. Barceló-Coblijn (2011) for an insightful discussion of this point.

4 Depending on the nature of the entities whose pertinence is at issue, conclusions need to be underpinned by various other theories, including a theory of what language evolution as a phylogenetic process involves, and theories of aspects of language such as structure, meaning, use and so on (Botha 2016: 23–26).
5 On the characterisation by Hauser, Chomsky and Fitch (2002: 1570–71), the FLB includes an internal computational system (or FLN) along with at least two other organism-internal systems, which they label 'sensory-motor' and 'conceptual-intentional'. The FLN is taken by them to be the linguistic computational system alone, representing what they refer to as 'language in a restricted or narrow sense'.
6 As characterised by Chomsky (1986: 19–22), an I-language is an element of the mind of a speaker-listener. It is acquired, known and used by a person. An E-language, by contrast, is an object that exists outside the mind of a speaker-listener; for example, a collection of utterances, words, sentences or speech events.
7 Cf. Tattersall (2017: 66) in this regard.
8 Cf. Botha (2016: 21–22) for a fuller discussion of what a linguistic ontology is and, in particular, of the conditions that a concept of 'language' should meet as a core component of such an ontology. I set out these conditions in Chapter 7.
9 Cf. Botha (2016: 17–18) for a discussion of the function of bridge theories as well as the conditions that they need to meet.
10 Referring to Corey et al. (2001: 145), Papadatou-Pastou (2011: 249) defines handedness as '... the individual's preference to use one hand predominantly for unimanual tasks and/or the ability to perform these tasks more efficiently with one hand'.
11 It is generally accepted that at the population-level the left cerebral hemisphere is dominant for language in right-handers (96 %, Knecht et al. 2000; Pujol et al. 1999). This is also the case with a majority of left-handers (73 %, Knecht et al. 2000; 76 % Pujol et al. 1999). I return below to an important qualification of these findings.
12 Cf. Botha (2016: 181–82) for some pertinent references. I take up this point again in Section 11.3.3.
13 Benítez-Burraco and Longa refer to Ifthikharuddin et al. (2000), Lieberman (2000, 2006), and Watkins et al. (2001) in support of this point.
14 Benítez-Burraco and Longa refer to Just et al. (1996) in support of this point.
15 Benítez-Burraco and Longa refer to Liégeois et al. (2008) in support of this point.
16 In a later article, (Fiore et al. 2015: 19), Frayer and three co-authors repeat the view that '[h]andedness is a proxy for brain lateralization, and by extension, language capability'.
17 Cf. Cashmore et al. (2008), Cochet and Byrne (2013), Uomini (2009, 2011) for a discussion of some of these issues.
18 An appraisal of Frayer et al.'s (2010: 122) claim that there are 'numerous new reasons [in addition to the one derived from scratched teeth/right-handedness/left-lateralisation – R.B.] from different data sources ... to reject the notion that Neandertals lacked linguistic competence' falls outside the scope of this chapter too. Even if these reasons – derived from 'behavioral and anatomical studies of Neandertal fossils and the recent discovery of their possession of the *FOXP2* gene' (p.113) were unproblematic, they clearly do not bear on the soundness of the scratched-teeth inference. For some criticisms of these reasons, see Benítez-Burraco

and Longa (2012: 189). And in Section 11.3.2, I appraise the soundness of the inference drawn about Neanderthal language from the *FOXP2* gene.

19 Cf. Roebroeks and Soressi (2016: 6373) for these particulars.

20 For these particulars, Roebroeks and Soressi (2016: 6373) refer to Hublin (2009) and Stringer and Hublin (1999).

21 Cf. Higham et al. (2014). As noted by Roebroeks and Soressi (2016: 6373), this is earlier than the late survival attributed to European Neanderthals.

22 In similar vein, Pettitt (2011a: 136) has cautioned against treating Neanderthals from a behavioural perspective as a monolithic archaic species. See Section 6.1 for the context of his warning.

Part II Symbolic Behaviours

1 Claims attributing forms of complex behaviour to Neanderthals are on the whole not underpinned by an explicitly articulated theory of what it is that makes a form of behaviour complex.

2 In terms of a definition adopted by the Australian Museum, late *Homo neanderthalensis* lived between 45,000 and 28,000 years ago (Dorey 2015). Forms of symbolic behaviour, however, have been attributed to some Neanderthals who lived more than 45,000 years ago (cf. Morin and Laroulandi 2012; Radovčić et al. 2015; Zilhão et al. 2010; and Section 3.3.1.3). I will therefore refrain from using the term 'late Neanderthals' and identify the Neanderthals to whom symbolic behaviour has been attributed by referring to the archaeological sites – caves or rock shelters – where some of their skeletal remains and/or putative artefacts were recovered.

3 Even the linguists Robert Berwick and Noam Chomsky (2016: 50) are of the view that '[a]ll we have to go by are the symbolic proxies for language behavior'. Along with Tattersall (2010), they note, though, that 'the material evidence for Neandertal symbolic behavior is exceptionally thin'. I turn in Chapters 7 and 11 to the conclusion that they draw from this contention.

4 It will be shown in Chapter 3 that one of the causes of this controversy is that debates about the putative symbolic behaviour of Neanderthals are on the whole conducted within a conceptual framework that lacks an adequately articulated theory of symbolism. In the absence of such a theory, the notions of 'symbol', 'symbolic behaviour', 'symbolic capacity' and 'symbolic thinking' are often used interchangeably in discussions of Neanderthal symbolism.

5 I use the term 'language' here – and, where appropriate, further – for the cognitive entity/entities referred to in an ontologically opaque way in the pertinent Neanderthal literature with the aid of such expressions as 'language', 'language ability', language capacity' and the like. In Section 7.2.1, I discuss a number of the ways in which this opacity detracts from the soundness of inferences that have been drawn about what some Neanderthals might have had in the way of linguistic attributes.

Chapter 3 Making and Wearing Personal Ornaments

1 The earliest comprehensive list and description of the finds in the cave is by Movius (1969: 115). On this account, they include a 'fairly substantial flint tool assemblage', a variety of 'bone materials' that have been worked, and also other objects

'which belong rather in the realm of aesthetic manifestations'. These last include 'an abundance of ochre and manganese', 'various ornamental objects – teeth and bones grooved or pierced for suspension as beads', 'pendants of several types', 'bone rings', '*marques de chasse* and other incised objects', as well as 'fossils and minerals collected and brought to the site'. Movius (1969: 115ff.) describes the various objects in considerable detail, depicting for instance *baguettes* as 'slender fragments of cylindrical bone (or broken segments of either points or pins), often less than 3 mm. in diameter' (p. 119).

2 For some of the earlier exchanges in this debate, see for instance d'Errico et al. (1998), Mellars (1998), Taborin (1998) and White (1998). The origin and significance of objects found in Châtelperronian layers of some other sites have been debated even more hotly. See in this regard the personal nature of the exchanges between Zilhão et al. (2008a, 2008b) and Mellars and Gravina (2008) about the excavation of the Grotte des Fées ('Fairy Cave') in the commune Châtelperron in the Auvergne, France.

3 See, e.g., Bailey and Hublin (2006), Caron et al. (2011), d'Errico et al. (1998), Hublin (2009), Hublin et al. (1996, 2012), Stringer (2011), Welker et al. (2016), Zilhão et al. (2013).

4 See, e.g., Bar-Yosef and Bordes (2010), Higham et al. (2010), Higham et al. (2011), Mellars (2010), Taborin (1998) and White (2001). For a fuller list of scholars who have been sceptical about the link between Grotte du Renne Neanderthals and the ornaments concerned, see d'Errico et al. (1998).

5 Chase (2006: 181) defines an industry as 'all the lithic assemblages that resemble one another'. An assemblage consists on his definition of 'all the lithic and other artifacts coming from a single provenience, usually one geological level or stratum at one site'. According to him, industries are sometimes misleadingly referred to as 'cultures'.

6 d'Errico et al. (1998) make this argument within a framework of their case against the notion of Neanderthal acculturation. Commenting on this case in a supplement to *Current Anthropology* (Volume 39, June 1998), various scholars are critical of particular components of this case, without challenging this argument, though.

7 Following the Aurignacian, the Gravettian is an advanced Upper Palaeolithic tool-making industry that dates to between roughly 28,000 and 22,000 thousand years ago and that is characterised by straight blunt-backed blades with narrow points (The Bradshaw Foundation: Glossary of Terms and Definitions).

8 This is not the case with similar finds that were made at a second site in south-east Spain, the Cueva Antón. These finds, that is, date back to the period in which Neanderthals and modern humans presumably had contact. The finds were taken by Zilhão et al. (2010: 1023), however, to indicate that Neanderthals were symbolically organised 'until the very end of their evolutionary trajectory'. However, on the basis of more precise dating of the Middle-to-Upper Palaeolithic transition in Murcia (Spain) that supports late Neanderthal persistence in Iberia, Zilhão et al. (2017) have since come to the conclusion that the finds from the Cueva Antón can be associated with Neanderthals.

9 U-series or U-Th dating is used to establish ages for the formation of objects by measuring the amount of radioactive thorium they contain.

10 These results could become contentious if new finds were to indicate that modern humans occupied the sites concerned during the same period as Neanderthals or during an earlier one. That is, the view held by Zilhão (2012: 41) and others that at that time there was nobody else other than Neanderthals around in Europe who could have made the artefacts at issue may be less factual than it appears at first blush.
11 Cf., e.g., Bar-Yosef and Bordes (2010), Higham et al. (2010), Mellars (2010), Mellars and Gravina (2008), Taborin (1998) and White (2001). The imitation hypothesis has several variants, including the one proposed by Coolidge and Wynn (2004: 55, 66) in terms of which Neanderthals created the artefacts at issue through a form of observational learning known as 'emulation'. Emulation involves a subject's understanding a goal but applying her/his own procedure for achieving it. This procedure is devised by her/him on the basis of an examination of the finished products concerned.
12 Cf., e.g., d'Errico et al. (1998) and Zilhão et al. (2006a).
13 Vanhaeren (2005: 537) lists some other sites at which items with a presumed ornamental function were recovered in Châtelperronian layers, including Quinçay Cave (perforated wolf, fox and red dear canines), Châtelperron (a perforated fox canine), Roche au Loup (bovid incisors and an ivory ring), Trilobite Cave (a bear incisor and a *Pecten* sp. shell), Cauna de Belvis Cave (a *Turitella* sp. shell), Saint-Césaire (*Dentalium* sp. shells), and Roc de Combe (a carnivore canine identified as a lynx canine). She (2005: 541) maintains in addition that '[d]iscovery of carnivore teeth with unfinished perforations in the Châtelperrononian levels of Roc de Combe (Sonneville-Bordes, 2002) and by-products of ivory rings and decorated bone tubes in the same cultural layers of Grotte du Renne (d'Errico et al. 1998) suggests Châtelperronian ornaments were produced by Neanderthals rather than obtained from modern humans'.
14 In support of this observation, Moro Abadía and Nowell (2014: 966) refer to Wynn and Coolidge (2010) for memory; to Mithen (2005: 2009) for musicality; to d'Errico et al. (2003) and Zilhão (2007) for symbolisation; to Davidson and Noble (1989) for perception; and to Overmann (2013) for numeracy and the concept of time.
15 See, e.g., d'Errico et al. (1998), d'Errico and Blackwell (2016), d'Errico and Vanhaeren (2009), d'Errico and Villa (1997), Vanhaeren (2005), Vanhaeren and d'Errico (2006), Zilhão (2007, 2011, 2013), Zilhão et al. (2010).
16 I will return in Section 3.5 to the view that such ornaments were used by Neanderthals as symbols.
17 Blombos Cave is an archaeological site located on the south-western coast of South Africa. For a discussion of the linguistic significance assigned to the shell beads excavated at this cave, see Botha (2016: chapter 3). I return in Section 3.5.1 to the putative symbolic status that has been attributed to these beads.
18 It also needs to be ruled out that the objects whose status is at issue had a utilitarian function. It has been observed, for instance, by Coolidge and Wynn (2011: 380) that the Blombos beads may have been tokens in a tallying device, whereas Overmann (2013: 19, 26) argues that these beads acted as scaffolds for explicit concepts of number which, in turn, may have scaffolded explicit concepts of time.
19 In an article published in 2007, Zilhão (2007: 15) still remarked that no counterparts of the Blombos beads had ever been found in the Middle Palaeolithic of Europe and that this represented a major difference between the two continents.

20 The typical marker of the Still Bay tradition is described by Henshilwood and Dubreuil (2011: 369) as 'the bifacial foliate point (laurel-leaf shaped)'. According to them (2011: 376), 'short, thin blade blanks with high-angled, off-centre platforms that were retouched to make these backed pieces [i.e., hafted composite tools – R.B.] were seen as characteristic of the [Howiesons Poort – R.B.] industry'.

21 Thus, referring to a view of symbols held by Chase and Dibble (1987), who proceed from the definition of symbols that forms part of Peirce's theory of signs, d'Errico et al. (2005: 4), in turn, assert that '[a] key characteristic of all symbols is that their meaning is assigned by arbitrary, socially constructed conventions'. Furthermore, following Deacon (1997: 70), Henshilwood and Marean (2003: 635) state that '[s]ymbols are representative of social conventions, tacit agreements, or explicit codes that link one thing to another and are mediated by some formal or merely agreed-upon link irrespective of any physical characteristics of either sign or object'.

22 As a component of an early version of Peirce's theory of signs – his so-called 'semiotic' – this trichotomy entails that the following: If a sign is interpreted as standing for its object in virtue of –

- a brute existential fact, a causal connection, then it is an index, e.g., a weather cock;
- a shared quality, then it is a 'likeness' or an icon, e.g., a portrait or a painting;
- a general or conventional connection, then it is a symbol, e.g., the word 'homme' or 'man'.

In later work, Peirce broadened this trichotomy to capture, for instance, the idea that icons and indexes are always partly symbolic or conventional, calling these the 'hypo-icon' and the 'sub-index'. In what is called his 'final account', he provided for a typology of sixty-six classes of signs. For a succinct account of the various versions of Peirce's theory of signs, including the distinction between indexes, icons and symbols, see, for instance, the *Stanford Encyclopedia of Philosophy* at https://plato.stanford.edu/entries/peirce-semiotics/.

23 Like Coolidge and Wynn, Malafouris (2011: 386) is not convinced of the parsimony of Henshilwood and Dubreuil's symbol inference: 'I cannot see anything 'parsimonious' about the inference that beads can act as symbols'. In this regard, he mentions the non-parsimonious nature of Henshilwood and Dubreuil's proposed association between changes in prefrontal and temporoparietal areas and changes in higher theory of mind and perspective-taking abilities to warrant their claim for the symbolic use of beads.

24 I return later to additional distinctions that may be incorporated into this theory so as to make it even more restrictive.

25 It is important to keep in mind here the distinction between data, facts and evidence drawn in Section 2.5.

26 Diepkloof Rock Shelter is described by Henshilwood and d'Errico (2011: 78) as a quartzitic sandstone shelter located 180 kilometres north of Cape Town and 18 kilometres from the Atlantic ocean. The shelter has a 2.5 metres deep MSA sequence classified from top to bottom as Post-Howiesons Poort, Howiesons Poort, Still Bay, and Pre-Still Bay. A number of engraved ostrich shell fragments, dated circa 60,000 years ago, were found in the upper levels of the Howiesons Poort (HP).

27 Having examined Henshilwood et al.'s (2009) reasons for assigning symbolhood to the Blombos engravings, Malafouris (2013: 189) concludes that 'the efforts to interpret MSA markings symbolically or semantically have been unconvincing if not altogether misleading'. To his mind, 'there is little doubt that there is nothing symbolic – in the arbitrary representational Peircean sense of the word – in the Blombos engravings'. In a recent article, Rodriguez-Hidalgo et al. (2019: 1) attribute symbol-hood to an eagle pedal phalange recovered from the Châtelperronian layer of Foradada Cave (Calafell, Spain) by invoking a number of criteria for symbolicity that resemble those implicit to the 'arguments' or 'explanations' by Henshilwood and d'Errico in an essential way. That is, these criteria – and the data associated with them – do not bear in an obvious way on the distinctive features of symbols provided for in a theory such as Peirce's.

28 Pettitt characterises these uses as follows:

> *Decoration*: the employment of colouring/ornamentation for visual effect with no associated symbolic meaning, *or* the uninformed reading of an otherwise symbolic code ('I wear red because I like red').
>
> *Enhancement*: the use of colouring/ornamentation/modification to bring out a simple (symbolic) message by enhancing existing clues ('I wear red as I know you will read it as a sign of my strength or be impressed by it').
>
> *Accessorization*: the use of colouring/ornamentation/modification to make a more subtle or specific statement than enhancement by acting as a material cultural accessory to a message ('I wear red as I know you will recognize it as the regalia of our clan and infer from it that we are culturally the same').
>
> *Full symbolism*: the use of colouring/ornamentation/modification to make an explicit statement by acting as a full material cultural symbol from which a reader can decode complex messages from [sic] ('I wear red as, like you, I am a successful hunter and have killed an adult eland; it is my right to wear this colour and I therefore command respect from all').
>
> *Time/space-factored symbolism*: the incorporation of temporal and spatial dimensions into full symbolism, e.g. beliefs, myths and stories, object biographies and histories ('I wear red only at a specific time, marking the time of the year when the ancestors created this land, in honour of the creation myths and to mark out that I am the bearer of this knowledge')'. (Pettitt 2011b: 148)

29 With reference to a number of concrete instances, Chase (2006: 127ff.) shows how much care should be taken to distinguish symbolic from utilitarian functions of prehistoric objects. In his view (2006: 127), 'only in extreme cases can one accept with any confidence the argument that some object must have been "non-utilitarian"'.

30 What such an analysis involves is illustrated by Majkić et al.'s (2018) analysis of sequential incisions on a bone – a cervical vertebra – from a cave bear found at Pešturina Cave, Serbia, in a Mousterian archaeological level dated by radiocarbon at 43.5–44.6 kyr cal BP and by ESR to between 93.5 and 102.5 kyr BP, d'Errico being one of the co-authors of this paper. On the basis of this analysis, the authors (2018: 104) give five reasons that make it difficult to unambiguously establish the symbolic nature of the incisions at issue. For the purpose of analysing the properties of putatively symbolic prehistoric artefacts, Bouissac (2003: 18–21) adopts the distinction between intrinsic and extrinsic formal features.

31 In an earlier appraisal of the evidence that might be adduced in support of the view that Neanderthals had symbols, Wynn and Coolidge (2012: 121) mentioned the possibility that Neanderthals' 'use of pigments might have played a conscious indexical role'.
32 During the past forty years, various scholars have cautioned against too easy an adoption of the uniformitarian assumptions that underlie the drawing of inferences about behaviours and capacities of earlier hominins from data about behaviours and capacities of modern humans. See Botha (2016: 274, n. 9) for a discussion of this point, including some pertinent references.
33 This lacuna is also found in surveys of evidence about Neanderthal symbolic behaviour such as Jane Renfrew's (2009).
34 These remarks are clearly intended to apply to archaeological debates about the putative symbolic behaviour of Neanderthals and the prehistoric inhabitants of Blombos Cave. As observed by Robb (1998: 330), 'a complete archaeological bibliography on symbols could include several thousand works' that adopt various approaches in dealing with a range of aspects of symbolism. The semiotic theory of symbols used in the debates about the potential symbolism of the Blombos and Neanderthal artefacts represents the approach called by Robb (1998: 332) 'the information transmission view' or 'the symbols as tokens view'. Robb contrasts this view with two other approaches: (i) 'the mental reality approach' or 'the symbols as girders approach', in terms of which symbols constitute and structure the mental and social world of ancient people (1998: 334–35) and (ii) 'the symbols as tesserae approach', in terms of which symbols are '... fragments with qualities such as colour, shape, and size, inherently arbitrary, that are temporarily assembled and experienced as meaningful by people playing with them' (1998: 338).

Chapter 4 Producing Cave Art

1 Cf. note 3 to the introductory section of Part II for the full list of aesthetic or unique objects attributed by Peresani et al. (2014) to Neanderthals. The so-called Mask of la Roche-Cotard is a flat stone with a shape resembling the upper part of a face, the eyes being represented by a piece of bone inserted in holes in the stone (Marquet and Lorblanchet 2000, 2003). The stone was found in 1975 in the entrance of the La Roche-Cotard Cave on the banks of the Loire in Langeais (Indre-et-Loire), France.
2 According to an experiment conducted by Rodríguez-Vidal et al. (2014: 13304–05), a minimum of fifty-four cutting strokes were needed to engrave the widest and deepest line, and between four and thirty strokes to engrave each of the other multiple stroke lines.
3 Dibble (in Callaway 2014: 2), however, has misgivings about the status of the hashtag grooves and their maker.
4 In a recent article, Li et al. (2019: 1) report the discovery of two 'engraved' bones from the Lingjing site in Henan Province, China. According to them (2019: 3), these bones are between 105 and 125 years old and the incised lines on them were deliberately made by hominins whom they speculatively portray as Denisovans. One of the bones, they (2019: 11) find, was smeared with haematite-rich deposits to highlight the engraved pattern and to increase its visibility. Li et al. (2019: 12)

attribute meaning to the incised patterns, despite the fact that they 'are still far from understanding the meaning of these engravings for the archaic humans living in China during the early Late Pleistocene'. Significantly, they (2019: 1) claim that their 'research provides the first evidence for the deliberate use of ochred engravings for symbolic purposes by East Asian Late Pleistocene hominins'. The latter claim clearly represents the conclusion of an unsound inference, one which lacks the required factual grounding. That is, to be able to draw this inference, it is necessary to show that the 'engraving' had a symbolic meaning for the hominins concerned. Li et al.'s attribution of symbolic meaning to the incised lines has been questioned by Roebroeks (in Spiering 2019: 4) as well. Thus, he argues that we simply don't know why the hominins concerned incised the lines on the bones. We need to know more, he states, to be able to draw conclusions about the symbolic intentions of these hominins; at present we have only some ten parallel man-made lines.

5 Recall that U-series dating or U–Th dating is used to establish ages for the formation of objects by measuring the amount of radioactive thorium they contain. As explained by Pike et al. (2017: 41), if mineral deposits have a clear stratigraphic relationship with the art concerned, U–Th dating can produce maximum and minimum ages for the art: maximum ages if the art is created on top of the deposits; minimum ages if the deposits overlie the art. The reliability of the U–Th method of dating art has been criticised by, amongst others, Sauvet et al. (2017), and defended by Pike et al. (2017).

6 Pettitt et al. (2014: 47) provide an account of the ways in which hand stencils are associated with specific features of walls of caves. They suggest that the positioning of stencils on walls of Cantabrian caves such as El Castillo and La Garma is far from random. More specifically, that "[m]ade under conditions of low and flickering light … touch – "palpation" – as much as vision, would have driven and directed the locations used for these stencils'. In a more recent paper, Hodgson and Pettitt (2018: 601, 606) propose, amongst others, that hand prints/stencils and early figurative art are associated with surface topography or pareidolia, the seeing of patterns in random or vague stimuli.

7 See also Brumm (in Sample 2018: 3) for this conclusion and the two reservations from which it derives.

8 See note 6 to Chapter 9 for a recent attempt by Mellet et al. (2019) to bring to bear neuroimaging data about the perception of modern humans on the possible symbolhood of abstract engravings dating back to the Lower and Middle Palaeolithic.

9 Wynn (1995: 10) characterised a handaxe as a bifacially trimmed tool with sides converging to a usually rounded tip that rarely comes to a sharp point. More recently, Wynn and Gowlett (2018: 21, 27) describe the Acheulean handaxe as (i) an ergonomically designed sturdy hand-held cutting tool in the context of a knapped-stone technology that lacked hafting and (ii) expressing an aesthetic preference for regular form with gradual curves and pleasing proportions. They (2018: 22) provide a range of reasons for considering handaxes to be cultural products whose manufacturing did not require a genetic control mechanism.

10 A third general conclusion by Wynn and Berlant (to appear: 33) concerns the evolution of the handaxe aesthetic during the 1.5 million years that handaxes of the type at issue played a role in hominin lithic technology.

11 As noted by Wynn and Berlant (to appear: 20), the 500,000-year-old handaxes recovered at Boxgrove were made during a twenty-five year period by a single community of *Homo heidelbergensis*.
12 Earlier, Hodgson (2014: 57) argued that the Blombos engravings and Diepkloof ostrich eggshell patterns did not have a symbolic function, as claimed by some archaeologists. In terms of Hodgson's analysis, these artefacts had rather an indexical function. He also made the more general point that 'although some of the southern African artefacts demonstrate particular kinds of "symbolic" intent, others need to be approached with caution'.

Chapter 5 Beautifying Bodies

1 Discussing the early (pre-45ky) use of ochre in South Africa, Watts (2009: 72) dismisses what he refers to as the 'tanning hypothesis', since no ethnographic or leather-industry sources confirm similar use of iron oxides. He (2009: 73) considers the 'hafting-cement hypothesis' consistent with archaeological reports from relatively late (post-80 ky) MSA assemblages.
2 Commenting in (Appenzeller 2013: 303), Dibble likewise observes that pigment has many possible uses, including those of an insect repellent, a preservative for food or animal skin and an ingredient in adhesives. Wynn (personal communication) is of the view that the failure to develop a model in terms of which the function of pigment is to 'change the appearance' of the user, represents a missed opportunity.
3 Asserting that groups of Neanderthals in Europe utilised dark pigments such as manganese oxide and pyrite, Stringer (2011: 163) notes that '[s]ome of this may have been for functional reasons' Jane Renfrew (2009: 57), in turn, wonders what materials such as manganese oxide were used for by Neanderthals. And she goes on to speculate that '[t]hey may well have been used to decorate the bodies of the living or to decorate animal skins and tools but so far we have no evidence'. Roebroeks et al. (2012: 1893) find that early Neanderthals used red ochre between minimally 200,000 and 250,000 years ago at Maastricht-Belvédère, but in their view 'there is no reason to assume that the mere presence of iron oxide at an archaeological site, whether Neandertal or modern human, implies symbolic behaviour'.
4 Early humans are believed to have used pigment for a symbolic purpose in the Middle Stone Age in Africa. Thus, on the basis of a recent study, Brooks et al. (2018: 94) suggest that roughly between 295,000 and 320,000 years ago pigment 'may have been of social and symbolic importance' in Africa. A sizeable sample of minerals was recovered in 1999 at Twin Rivers in central Zambia. This find provides, according to Barham (2002: 181), 'evidence for the systematic collection and processing of pigments'. This mineral sample exhibits a range of colours, including yellow, brown, red, purple, pink and blue-black, which elicited from Barham (2002: 188) the opinion that '[f]rom this selection a broad palette could have been mixed but the social context of its use – whether functional, symbolic, or both – must remain speculative'.

Chapter 6 Burying the Dead

1 The former scholars include d'Errico and Stringer (2011: 1064–65), d'Errico and Vanhaeren (2016), d'Errico et al. (2009: 35–39), Gamble et al. (2014: 172), Hovers

and Belfer-Cohen (2013: 634), C. Renfrew (2009: 51–54), Roebroeks and Soressi (2016: 6375), Stringer (2011: 126–27, 150), and Zilhão (2015).

2 It is argued in Section 2.5 as well that Neanderthals do not constitute a monolithic species.

3 The Roc-de-Marsal (also spelled without hyphens) is a Mousterian cave near Les Eyzies in the Dordogne department, France. In an earlier paper, Sandgathe et al. (2011: 243) expressed 'serious doubts' about whether the Roc-de-Marsal child was intentionally buried.

4 As observed by Pettitt (2011a: 103), the names of several more caves might be added to this list. He (2011a: 81–91) presents particulars of a total of forty-two sites at which such Neanderthal remains were found. Those listed above are deemed to be of special importance since, as Pettitt (2011a: 103) points out, it is probably fair to say that most scholars would accept them as sites of deliberate burials.

5 Cf. Pettitt (2011a: 82–86) for many more descriptions of Neanderthal skeletal remains and the state in which these were found at a range of sites.

6 Dibble et al. (2015) – some of whom co-authored Sandgathe et al. (2011) – invoke essentially the same criteria to controvert the claim by Rendu et al. (2014) that the remains found in the bouffia Bonneval at La-Chapelle-aux-Saints represent an intentional Neanderthal burial. For the origin of these criteria, Dibble et al. (2015: 650) refer to Gargett (1999: 47) and Duday et al. (1990). Gargett (1989: 161), in turn, seems to have taken over four of the criteria from Bouyssonie et al. (1908): (1) the position of the body, flexed as in sleep; (2) a dug grave; (3) protection of the corpse; (4) food or other grave offerings; and (5) magic or ritual manifestations. For the fifth criterion, Gargett refers to Shackley (1980: 85–86), Binford (1968b: 140–41), and Harrold (1980: 197). He, moreover, asserts that Binford's (1968b: 140–41) criteria were 'the presence of an excavated grave and/or arrangement of the body or body parts which seem to preclude natural agency'. Finally, Gargett (1989: 161) describes Harrold's (1980: 197) criteria as 'somewhat more selective' in the sense that 'a case was not counted as a burial without some strong positive indication to that effect, such as strongly flexed body position [in which the legs are drawn up beneath the chin – R.B.], or unequivocal association with a burial trench or grave goods'. Hovers and Belfer-Cohen (2013: 633) argue for the adoption of criteria for intentional burials that are stricter than those invoked by Pettit (2002) and others. According to Hovers and Belfer-Cohen, variables such as skeletal completeness, anatomical position of *all* bones, or clearly visible burial pits cannot be relied on unconditionally as differential criteria. These variables, they assert, were highly dependent on particular sedimentological and depositional circumstances.

7 According to Sandgathe et al. (2011: 244), since the appearance of the initial articles on the Roc-de-Marsal find, the Roc-de-Marsal skeleton has been included in every book and article listing accepted uncontroversial examples of intentional burials. They give particulars of eight of these publications.

8 Invoking the criteria stated above, Dibble et al. (2015) also argue that Rendu et al. (2014) have failed to show that the La Chapelle Neanderthal was intentionally buried.

9 In line with Vandermeersch (1976), Hovers and Belfer-Cohen (2013: 636) believe that the physical proximity of objects to buried skeletal remains cannot itself

substantiate an interpretation as 'grave/burial gifts'. In addition to their physical proximity, such objects need to be rare or unique. According to them (2013: 637), the appearance of ochre with Middle Palaeolithic burials such as those at Qafzeh Cave in Israel 'may portray a symbolic relationship', given the lack of evidence for utilitarian ochre use in the Levant. Cf. also Hovers et al. (2003) for this view.

Chapter 7 Leaping to Language

1 Dediu and Levinson (2013: 1) actually make the more radical proposal that 'essentially modern language is phylogenetically quite old, being already present in the common ancestor [i.e., *Homo heidelbergensis* – R.B.] of these two lineages [i.e., Neanderthals and Denisovans – R.B.] about half a million years ago'
2 I return in Section 7.4 to the idea of a two-slot grammar.
3 Johansson (2013a, 2015), Barceló-Coblijn and Benítez-Burraco (2013) and Progovac (2016) represent the exceptions here.
4 As has been shown in Section 2.2, by Frayer et al. (2013), for instance. See also Section 8.2 for instances of the failure by some archaeologists to draw a distinction between language as a cognitive capacity and the use of language in processing linguistic utterances. As for the notions of 'language ability' and 'language capacity/capacities', it needs to be made clear what having such an ability/capacity/capacities involves as opposed to having language itself.
5 As regards late Middle Palaeolithic bifacial tool variability, Ruebens (2013: 341) identifies '... a distinct three-fold, macro-regional pattern ... : the Mousterian or Acheulean Tradition (MTA) in the southwest dominated by handaxes, the Keilmessergruppen (KMG) in the northeast typified by backed leaf-shaped bifacial tools, and, finally a new unit, the Mousterian with Bifacial Tools (MBT), geographically situated between these two major entities, and characterised by a wider variety of bifacial tools'.
6 I have been unable to find in recent literature any scholars doing a form of prehistory who explicitly deny that the language attributed by them to Neanderthals was symbolic. The linguists Robert Berwick and Noam Chomsky (2016: 154), however, are of the view that Neanderthals did not possess '... anything like the Basic Property or even the rudiments of symbolic language'. According to them (2016: 1), the Basic Property of language involves '... that a language is a finite computational system yielding an infinity of expressions, each of which has a definite interpretation in semantic-pragmatic and sensorimotor systems (informally, thought and sound)'.
7 This concept of a linguistic sign is central to the linguistic theory of Ferdinand de Saussure (1959: 66ff.), hence it is often referred to as the 'Saussurean sign'. It is a core component of the semiological theory of Roland Barthes (1967) as well. In terms of it, meaning is construed as an indirect association between the linguistic signal and the information evoked by it. This construal is attributed by Frawley (1992: 8) to Aristotle, to Ogden and Richards, and to modern linguists such as Ray Jackendoff and George Lakoff.
8 According to Jackendoff and Wittenberg (2014: 68, 73, 74), a two-word grammar allows utterances of either one or two words, as in (i) English compounds such as 'snowman', 'helicopter attack' and 'union member' and (ii) utterances such as 'Mommy fix', 'big house' and 'Mommy pumpkin' produced by two-year olds.

Part III Non-symbolic Behaviours

1 As regards wooden tools, forty partially charred 'digging sticks', made from very tough boxwood, have been recovered at the Neanderthal site of Poggetti Vecchi at Grosseto, Tuscany in central Italy, dated to roughly 171,000 years before present. This find is taken to indicate that the Neanderthals who occupied the site had the ability to use pyrotechnology to skilfully manufacture wooden tools. (Aranguren et al. 2018: 2054, 2058; Hoffecker 2018: 1, 2)

Chapter 8 Making Stone Tools

1 On an account by Gordon Hewes (1993: 24), Benjamin Franklin, an ex-artisan and one-time printer, was in 1778 first to link humans and tools, writing that 'man is a tool-using animal'. To this aphorism, Thomas Carlyle in 1841 added that 'without tools he [i.e., man – R.B.] is nothing; with them he is all'. Hewes (1993: 26) claims Ludwig Noiré (1829–1889) to have been '... one of the few nineteenth century scholars to address the issue of the relation between tools and language in the full context of the then available prehistoric as well as linguistic evidence'. In a book published in 1880, Noiré argued, according to Hewes (1993: 26), that 'inarticulate vocalizations which had accompanied primordial tool-making and tool-using were gradually transformed through onomatopoeia into spoken syllables and words'. For some of the earlier work on the relation between tools and language done in the second half of the twentieth century, see Hewes (1993: 27–29).

2 (a)–(d) above are not the only ways in which the connection between stone tools and language has been portrayed. Earlier, Holloway (1969: 407) argued that 'both tool-making and language come out of the same cognitive structure'. Not believing that language must have followed tool-making, he contends that these two phenomena are 'concordant'. 'Language' is construed here by Holloway as language behaviour. More recently, Davidson (2010b: 199) has speculatively explored the possibility that there are analogies between the phases in language evolution distinguished by Ray Jackendoff (1999, 2002) and events in the archaeology of stone tools. Thus, according to Davidson (2010b: 199), the composite technology used in hafting of stone tips to spears may be analogous to the Phrase Structure Phase in Jackendoff's scheme. If this were the case, Davidson speculates, '... we might be led to argue that this technology is evidence of language having emerged in Europe at these times [i.e., perhaps 200,000 years ago – R.B.].'

3 Abstracting away from different types of stone tools and different modes of making such tools, this is only a rough characterisation of what is involved in making a stone tool. As for different types of stone tools, these include among others: (i) choppers typical of the Oldowan, the earliest known lithic industry (Mode 1 technology), mainly used for cutting, chopping and scraping; (ii) bifacial handaxes typical of the Acheulean, a later and more advanced lithic industry (Mode 2 technology), used mainly for butchering and skinning game, digging in the soil and cutting wood and plant material; and (iii) flakes produced with the aid of the sophisticated Levallois technique (Mode 3 technology), adopted first in the Mousterian, and used as scrapers and knives, among other things. (Davidson and Noble 1993:367ff); www.bradshawfoundation.com/origins/mousterian_stone_tools.php)

4 In his earlier work, Wynn (1995: 17) did not explicitly distinguish between language as a cognitive entity and language behaviour, as is evidenced by statements such as: 'Language is a rule-governed form of communication', and 'Language is the pre-eminent, and best understood, example of a rule-governed behaviour'.
5 In this regard, Wynn (1995: 17) also observes that '[b]oth language and tool use are sequential behaviors. This invites a comparison of the organizational features underlying each'.
6 Already in the eighties, Gatewood (1985) used the notion of a 'string of beads' to account for the way in which novices learn technical skills such as purse seining – a form of fishing using a large net towed by two boats. They understand such skills as involving actions that merely form a 'string of beads', a simple chaining of actions that has no distinct hierarchy (Graves 1994:160; Wynn 1993: 393). More recently, Derek Bickerton (2009: 187) argued that the word-like units making up utterances of incipient pidgins and protolanguage are organised like beads on a string. Cf. Botha (2016: 89–92) for an appraisal of Bickerton's inference that protolanguage utterances are organised in this way.
7 With reference to behaviours of modern humans, Wynn (1999: 270–71) expands on the differences between linguistic behaviour involved in 'language' and technological behaviour involved in tool-making and tool-use. He observes, for instance, that the technological behaviour of modern adults is clearly not organised in terms of lexical categories, and that the basic organisation of action is not equivalent to 'language'. These differences cause Wynn 1999: 271) to conclude that '[b]ecause no clear connection between the two behaviours can be demonstrated for modern humans, there is no basis for assuming that tools can inform us about prehistoric language'. Adopting an even stronger position, Graves (1994: 159) '. . . do[es] not believe that linguistic or textual properties (if these are in any way distinct) are represented archaeologically'.
8 For Wynn's characterisation of a handaxe, see note 6 of Chapter 4.
9 Wynn is by no means the only scholar to have noted in the 1990s the differences between 'language' and stone-tool making. Chase (1991), Graves (1994), and Noble and Davidson (1996), amongst others, did this too. Cf. Stout and Chaminade 2009: 92) as well.
10 Chronologically, these papers include Stout et al. (2008), Stout and Chaminade (2009), Stout (2010), Stout (2011), Stout and Chaminade (2012), and Stout and Khreisheh (2015).
11 The claim in box A may be seen as a conclusion inferred from data about the knapping and processing behaviours at issue. This possibility could be represented schematically in Figure 8.1 by adding an inferential step that precedes step B.
12 Cf. Botha (2016: 81–82) for a more technical account of the properties of analogical arguments.
13 The difference in size between the parietal lobes of Anatomically Modern Humans and those of Neanderthals may be indicative of a range of cognitive differences between the two human species. Wynn et al. (2016: 205) do not review literature according to which language is one of these. See also Pearce et al. (2016) for discussion of differences between the brain organisation of Neanderthals and that of Anatomically Modern Humans and the possible implications of the differences for

cognitive abilities to cope with fluctuating resources and cultural maintenance. I return to the significance of the differences involving language in Section 11.3.3.

14 The danger involved in uncritically making uniformitarian assumptions has been pointed out in Section 3.5.

15 There is a wide range of theories of language origin expressing alternative claims about the precursors of language, amongst other things. The list of candidate precursors includes not only phenomena such as primate communication and cognition but also the cognition, gesture, music/song, mimesis and rudimentary motherese of early humans, to mention some only. The case for a particular precursor, accordingly, needs to include reasons why it is to be preferred to other possible precursors proposed in serious accounts.

Chapter 9 Teaching Stone-Tool Making

1 The experimental study was carried out by a team led by Tom Morgan and Natalie Uomini. The team included Kevin Laland who gives an account of the study in his book *Darwin's Unfinished Symphony: How Culture Made the Human Mind* (2017: 201ff.).

2 The aim of Lambao et al.'s (2017: 1) study was to evaluate the role of language in the social transmission of lithic technology. They pursued this aim by designing and developing an experimental protocol through which they compared the acquisition of knapping skills in thirty non-expert modern humans in the early stages of learning. They investigated the role of three mechanisms of social transmission, described by them as 'imitation-emulation', 'gestural communication' and 'verbal communication'.

3 Putt et al. (2014: 96) conducted an experiment to test the effect of verbal communication on large core biface manufacture during the earliest stages of learning, using twenty-four modern human participants who lacked any flint-knapping experience. For an alternative interpretation of Putt et al.'s results, see Uomini (2017: 2).

4 Cataldo et al. (2018: 1, 3) conducted flint-knapping experiments with a total of seventy-one modern human participants, their main aim being to assess the efficiency of speech alone, unassisted by gesture, as a tool-making aid.

5 Ohnuma et al. (1997: 159) carried out a series of experiments to investigate the relationship between 'complicated tool-making and the presence or absence of language in its communicative role'. In these experiments, two groups of university students were taught to use the Levallois technique to produce flakes. From the results of the experiments, Ohnuma et al. (1997: 159) inferred that 'spoken language was not indispensable for Levallois flake production in the Middle Palaeolithic'.

6 In a recent study, Mellet et al. (2019) present neuroimaging data about how a number of modern humans perceive tracings of abstract engravings dating back to the Lower and Middle Palaeolithic. They (2019: 8) offer these data in support of the hypothesis that the engravings concerned could '... have been used as icons or symbols by early modern and archaic hominins'. They (2019: 8) find that these data show that the brains of modern humans perceive (the tracings of) these engravings '... as graphic entities having regularities to which semantic information can be connected'. These findings, they (2019: 8) maintain, '... support the hypothesis that these engraved patterns could have been used by human cultures of the past to store

and transmit coded information'. In reasoning in this way, Mellet et al. (2018) draw an analogical inference about the brains of these hominins and the semiotic status assigned to them by the engravings at issue. As shown with reference to the studies by Morgan et al. (2015) and Cataldo et al. (2018), analogical inferences drawn from features of modern humans about features of archaic hominins such as Neanderthals are unsound unless they meet the conventional conditions which apply to inferences of this form. Mellet et al. (2019: 2) are aware of the dubious soundness of such inferences, observing that 'mapping modern human brains has intrinsic limitations to draw definite conclusions on past brain organization'. To ameliorate these limitations, they contend that 'this approach has proved useful in studying the relationship between cognitive networks involved in the coevolution of toolmaking and language functions [32–34]'. Mellet et al.'s references [32] and [33] represent studies co-authored by Stout, Chaminade and others that do not offer a principled way of overcoming the limitations at issue. Recall that in Section 8.3 Stout's knapping inference has been shown not to satisfy the conditions that conventionally apply to analogical arguments. Mellet et al., accordingly, need to show that their analogical inference do satisfy these conditions.

Chapter 10 Hunting Big Game

1 These references are supplementary to similar ones given in the introductory section of Part III.
2 The spears were sharpened wooden staves and wooden staves with Mousterian lithic points (Adler et al. 2006: 105; Gaudzinsky-Windheuser 2018: 1087; Lazuén 2012: 2305; Villa and Soriano 2010: 5; Villa et al. 2009: 850). As noted by Wynn and Coolidge (2012: 27), archaeologists have recovered also a unique spear point carved from mammoth bone. Though these spears are generally assumed to have been used for thrusting, Milks (2018: 1057) does not exclude the possibility that they were used for throwing as well. The results of a recent experimental study by Milks et al. (2019: 1) are claimed by the authors to show that Neanderthals might have engaged in distance hunting as well, throwing spears such as those recovered at Schöningen to kill prey up to twenty meters away. And from this, they (2019: 1) infer that '. . . the resulting behavioural flexibility closely mirrors that of our own species'.
3 In terms of an estimate by Churchill (2014: 245), such a hunting party could have consisted of up to fifteen Neanderthals.
4 This scenario is based on a case study by White et al. (2018) of Neanderthal hunting strategies. The authors conducted similar case studies of kill or near-kill sites at Mauran, France (bison); La Borde, France (aurochs); Taubach, Germany (rhinoceros); and Salzgitter Lebenstedt, Germany (reindeer). According to White et al. (2016), the ambush site at Mauran was at the end of small gullet bounded by limestone escarpments (p. 2); at La Borde in an aven or collapsed cavern located at the base of a low hill (p. 6); at Taubach probably at the shoreline of a seasonally fluctuating lake within an internally drained basin (p. 9); and at Salzgitter Lebenstedt at the junction between the wide flat valley of the main river and the narrow gorge-like valley of its tributary (p. 14).
5 Gaudzinsky-Windheuser et al.'s (2018) claim that Neanderthals engaged in confrontational hunting is actually the conclusion of a composite inference. That is,

they infer it from their prior conclusion that Neanderthals used thrusting spears to kill prey at close range. This conclusion, in turn, is inferred by them from properties of perforations on two fallow deer skeletons retrieved at Nord-Mark, Germany, during excavations of 120,000-year-old lake shore deposits. Gaudzinsky-Windheuser et al.'s reasoning may be represented schematically as follows:
Properties of perforations in deer skeletons → Thrusting spears → Confrontational hunting → Cooperation by hunters
(where the arrows represent inferential steps).

6 Located on the southern shore of the Isle of Jersey, La Cotte de St. Brelade is a Middle Palaeolithic site (cave) occupied by Neanderthals during a long period stretching from roughly 240,000 to 40,000 years BP. To account for two heaps of bones recovered at the site, it has been hypothesised that Neanderthal hunters drove elephants and rhinoceros over the headland into deep granite ravines in mass kills. Elaborating on this 'game-drive'/'mass-kill' hypothesis, Wynn and Coolidge 2012: 31, 32, 34) paint a vivid picture of how the animals were stampeded by Neanderthal hunters, of how the animals plunged over a cliff, and of how those who did not fell to their death were killed by the hunters with thrusting spears. As argued at some length by Scott et al. (2014), the 'game-drive' hypothesis is not the only explanation of the composition and arrangement of the two heaps of bones recovered at La Cotte. Reconsideration of these heaps, according to Scott et al. (2014: 13), '. . . undermines the "mass-kill" hypothesis, suggesting that these were simply the final accumulations of bone at the site'. In the view of Papagianni and Morse (2015: 81), the 'game-drive'/ 'mass-kill' scenario testifies to the ability of Neanderthals to plan several steps ahead and communicate that plan. In their view, Neanderthals 'would have had to choreograph and execute a complex series of moves' to achieve a cliff fall such as the one at issue.

7 Informally, parataxis involves the placing of words, phrases or sentences next to one another without the use of lexical or grammatical means to indicate how they are related. The term 'Actor' refers to a semantic/thematic role normally associated with Nouns/Noun Phrases; it represents ' the primary, involved doer' (Frawley 1992: 203). The term 'Action' refers to a semantic/thematic role normally associated with Verbs/Verb Phrases. Thematic roles, on Frawley's characterisation (1992: 197), are semantic relations that connect entities to events.

8 For an appraisal of the heuristic power that incipient pidgins and home signs have as windows on language evolution, cf. Botha (2016: chapters 5 and 6).

9 Dediu and Levinson (2013: 9) '. . . conjecture that Neanderthal languages may have had more complex categories than the languages spoken by the often larger modern human groups that followed, and in particular by contemporary large-scale societies'.

10 Iconic gestures have also been referred to as 'depictive, imagistic, characterizing, representational, and symbolic gestures' (Tomasello 2008: 66).

11 These two examples are truncated versions of ones given by Tomasello (2008: 63–64) to illustrate people pointing in natural contexts.

12 Mithen (2005: 171–72, 221) has attributed to Neanderthals a communication system that he dubbed 'Hmmmmm'. It was:
Holistic: it used utterances that were not composed out of smaller meaningful units, being associated as wholes with complete messages.

Multi-modal: it used movement – gestures, body movements, dance-like movements – in addition to sound to produce these utterances.
Musical: it used pitch, tempo, melody, loudness, repetition and rhythm.
Mimetic: it used vocal mimicry in messages about calls and movements of animals.
For an appraisal of 'Hmmmmm' as a precursor to human language, cf. Botha (2009, 2016: 211–14, 223–24) and the literature cited there. 'Hmmmmm' clearly differs in fundamental ways from the gestural communication system discussed here.

13 The other 20% of the diet of these Neanderthals consisted of vegetarian food. Scientists made these findings by examining the isotope composition in the collagen from bones of Neanderthals who inhabited a number of sites in Belgium: the Goyet caves in the Mozet Commune in the Walloon Region, a site at Scladina and a site at Spy (Naito et al. 2016; Wissing et al. 2016). The results of a recent study by Jaouen et al. (2019: 4928) '... reinforce the interpretation of Neandertal dietary adaptions as successful top-level carnivores, even after the arrival of modern humans in Europe. They also demonstrate that high $\delta^{15}N$ values of bone collagen can solely be explained by mammal meat consumption, as supported by archeological and zooarcheological evidence'. According to Morin et al. (2019:1), the diet of archaic *Homo* populations in the north-western Mediterranean was broader than assumed by current evolutionary models, the consumption of small, fast game having been more common prior to the Upper Palaeolithic than previously thought.

Chapter 11 Dispersing the Murk

1 Tattersall (2008: 106, 108; 2016: 6) has repeatedly expressed his scepticism about the view that Neanderthals had symbols, engaged in symbolic behaviour or had symbolic cognitive processes. In his (2016: 8) view, language is '... the ultimate symbolic activity, virtually synonymous with symbolic thought as we know it today'.

2 In Section 8.3 I set out in some detail Berwick and Chomsky's (2017) criticisms of the claim by Stout and his co-authors (Stout and Chaminade 2008; Stout et al. 2009) that linguistic recursion and the motor operations involved in Palaeolithic tool making do not differ in essential ways. As I indicated in Section 8.3, I believe these criticisms to be correct, leaving Stout and Chaminade's hypothesis without empirical grounding.

3 Referring specifically to 'the paucity of preserved symbolic material', Dediu and Levinson (2013: 9) maintain that '... there is no argument to be made from Neandertal culture to the absence of language'.

4 These inferences should not be confused with inferences that have been drawn about Neanderthals' putative speech capabilities from some of their biological attributes, including their hyoid bone, ear bones (ossicles), larynx etc. This book is about Neanderthal language as a cognitive capacity, not about its possible use in some modality.

5 More fully, *FOXP2* is a gene which in humans encodes the protein called 'Forkhead box protein P2 (FOXP2)'. The gene is shared by other animals, including song birds, where it plays a role in the development of song. Outside the brain, *FOXP2* plays a role in the development of other tissues such as lung, gut and heart (Marcus and Fisher 2003: 5; Shu et al. 2007: 1991).

6 The term 'language gene' is in more than one way a misnomer. For instance, impairments in orofacial movements that are less sophisticated than those involved

in speech were found in affected members of the KE family (Alcock et al. 2000: 17, 19; Watkins et al. 2002: 462). In addition, the non-verbal intelligence of affected members was found to be significantly lower than that of unaffected individuals (Watkins et al. 2002: 462). See note 9 for another major reason why *FOXP2* should not be called a 'gene for language'.

7 Diller and Cann (2009: 135–36) have presented genetic evidence that the two mutations in *FOXP2* may have occurred some 1.8 million years ago when *Homo habilis* and *Homo ergaster* appeared in the fossil record.

8 Referring to Maricic et al. (2012), Dediu and Levinson do mention that there are subtle differences between the *FOXP2* variants of these lineages.

9 As noted in Section 10.2, Wynn and Coolidge (2012) do not draw a clear distinction between language, spoken language, speech and communication. They (2102: 8) do observe that 'FOXP2 [sic] is not a gene *for* language or speech; rather it is a gene that is involved in modern speech'. They proceed to say that '[t]here are undoubtedly many other genes involved in modern spoken language that have not been identified. Neandertals may or may not have had them. But their possession of FOXP2 [sic] is certainly provocative'. Stringer (2012: 190) is an instance of a prehistorian who views the *FOXP2* inference with some circumspection. He is of the opinion that the presence of the human form of *FOXP2* in the El Sidrón Neanderthals does not mean that they had fully modern language '... any more than the fact that the hyoid bones which sat in their throats were similar in shape to our own'. What is indicated to him is that 'we have no reason – from these elements of their biology – to deny them the *potential* for modern human speech capabilities'.

10 The complexities that have to be faced in attempting to draw conclusions about the evolution of language from so-called language/speech-implicated genes are daunting indeed. Over the years, these have been discussed in detail by a range of authors, including Benítez-Burraco (2006, 2012, 2013), Berwick and Chomsky (2016: 47ff., 151–52; 2017: 168–69), DeSalle and Tattersall (2018), Fisher (2006, 2013), and Mountford and Newbury (2018). As regards the drawing of inferences from data about hominin interbreeding, Benítez-Burraco and Barceló-Coblijn (2013: 277) claim that 'hominin interbreeding did not play a crucial role in the emergence of modern language'. It is also unclear whether/how the interbreeding of Neanderthals with (early) modern humans could have affected Neanderthals' linguistic attributes.

11 In their note 37, Kochiyama et al. (2018: 8) refer to Porrill et al. (2013).

12 In their note 38, Kochiyama et al. (2018: 8) refer to Price (2012).

13 The brains of modern humans and those of Neanderthals do not differ structurally only. Other differences include those in size, shape, evolutionary pathway and ontogenetic growth pattern and development (Bastir et al. 2011; Bruner 2004; Bruner et al. 2003; Hublin et al. 2015; Pearce et al. 2013). For an overview of the various kinds of differences, see Wynn et al. (2016: 202–07).

14 Anatomically demarcating Broca's area has turned out to be less than straightforward. For a discussion of some of the difficulties involved in doing this, see, for instance, Hagoort (2005, 2009: 281–82; Hagoort and Poeppel 2013; Poeppel et al. 2012). See Botha (2016: 72–74) for the way in which these difficulties have featured in discussions of language evolution.

15 There are scholars who are likely to harbour a more general doubt about the soundness of the brain inference. These scholars will maintain that claims about structural properties of Broca's area in Neanderthal brains are highly speculative.

Represented by Holloway (1983) and Bruner (2017a), they will argue that it is not possible to draw:

(i) indisputably sound inferences about the morphology of Neanderthal brains from data about fossil skulls and
(ii) further inferences from putative properties of brain structures such as Broca's area about what Neanderthals might have had in the way of language.

As observed by Bruner (2017a: 3), 'the relationship between endocranial gross morphology and cognitive processes is partial and imprecise, and fossils can only supply additional integrative support to a more complete scenario, which must be designed according to multiple and independent sources of information'. More cryptically, Bruner (2017b) states on his blog that 'fossils can provide only a very incomplete (and insufficient) view of this process [i.e., brain evolution – R.B.]'. For a fuller discussion of the limitations of what can be inferred from fossil skulls about the language capacity of non-modern hominins, see Botha (2016: chapter 4).

16 See, for instance, the quotes from Dediu and Levinson (2013) in Section 7.2.

17 Recall here the distinction between data, facts and evidence drawn in Section 2.5.

18 As noted in Section 10.2, Wynn and Coolidge (2012: 131) speak in this context of 'labels' that must have been 'words of some kind'.

19 For the notion of a (Saussurean) linguistic sign, see again Section 7.4.

20 The meanings of such sequences could have been narrowed down by pragmatics, a possibility mentioned by Wynn and Coolidge (2012: 131) too. It should also be kept in mind here that Jackendoff and Wittenberg's (2014: 68, 71) hierarchy of grammatical complexity provides for even simpler one-word grammars, in which utterances are restricted to a single word without syntactic properties. In the case of a fully complex language such as English, such utterances are exemplified by *hello, ouch, upsey-daisy* and *abracadabra.* Such utterances are also produced in the one-word stage of child language, where the word *doggie* can mean various things, depending on bits of meaning added on by the pragmatics. These include 'there's the doggie', 'where's the doggie', 'I want the doggie' and so on (Jackendoff and Wittenberg 2014: 71).

21 It is not superfluous to list some of the conclusions that have *not* been drawn here about Neanderthal language:

(i) 'All Neanderthals had a form of language with the properties concerned.' This would represent the conclusion of an unsound inference, since Neanderthals were not a single monolithic archaic species, having existed for hundreds of thousands of years and spread over a vast area in Eurasia (see Sections 2.5 and 6.1 in this regard).
(ii) 'Only Neanderthal hunters – and no other members of the groups to which they belonged – had the form of language concerned.'
(iii) 'Neanderthal hunters – and their kin – used this form of language for the sole purpose of communicating about matters related to hunting.'

The inferences that lead to these conclusions cannot be empirically grounded in what is believed to be known about what Neanderthals communicated to one another when they planned and practised ambush hunting.

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