Past Materials, Past Minds: The Philosophy of Cognitive Paleoanthropology

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Abstract:	The philosophy of cognitive paleoanthropology involves three related tasks: (1) asking what inferences might be drawn from the paleontological and archaeological records to past cognition, behavior and culture; (2) constructing synthetic accounts of the evolution of distinctive hominin capacities; (3) exploring how results from cognitive paleoanthropology might inform philosophy. We introduce some distinctive cognitive paleoanthropological inferences and discuss their epistemic standing, before considering how attention to the material records and the practice of paleoanthropology can inform and transform philosophical approaches.

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The philosophy of cognitive paleoanthropology involves three related tasks: (1) asking what inferences might be drawn from the paleontological and archaeological records to past cognition, behavior and culture; (2) constructing synthetic accounts of the evolution of distinctive hominin capacities; (3) exploring how results from cognitive paleoanthropology might inform philosophy. We introduce some distinctive cognitive paleoanthropological inferences and discuss their epistemic standing, before considering how attention to the material records and the practice of paleoanthropology can inform and transform philosophical approaches.

1. Introduction

Our membership of the species *Homo sapiens* has been used in attempts to explain and even justify everything from selfless acts of goodwill, to marketing campaigns, political policies and economic systems, to racism, violence and genocide. But understanding our species' nature requires understanding our quirky evolutionary history. Since that history matters, understanding how in fact we evolved, what the quirks are precisely, is crucial. Philosophers of mind, science (especially biology and cognitive science), and morality have had a lot to say about evolution and its relationship with human nature in addressing a broad range of questions. Why are we prone to violence? Why do we cooperate in some circumstances but not others? What is trust and under which circumstances is it lost? Why are some societies hierarchical? What is the nature of our relationship with technology? What role do biological processes play in producing human behavior? What role do cultural processes play? Is there such a thing as 'human nature' at all?

In this paper we introduce the philosophy of a particular set of perspectives on our evolutionary past, which we think ought to play a more prominent role in informing these questions. Namely, those inspired by the archaeological and paleoanthropological records: the philosophy of cognitive paleoanthropology.

Human psychology, society, and behavior are built by a complex set of interacting biological, ecological, environmental, and cultural forces. Archaeology and paleoanthropology offer a fascinating and revealing line of evidence regarding the history and nature of these processes: the archaeological record contains the materials of the past necessary to make sense of past minds. However, few philosophers have attended to the material records' evidential nature and the opportunities it offers. This is a shame: it represents one of the few empirical bulwarks holding to account excessive evolutionary speculation, ideologically biased assumptions, and misguided exceptionalism regarding our nature and its consequences. Moreover, evolutionary cognitive archaeology and paleoanthropology are treasure-troves of philosophical conundrums, inspiration, and surprises. Consider, for example, the shells of sea snails.

The marine gastropod *Nassarius kraussianus* is fairly abundant in southern Africa, as are their shells. Once a hole is carefully drilled through, such shells become beads with round, smooth,

shiny surfaces. These make for a nifty necklace. Around 75,000 years ago, ancient humans made beads from marine shells, likely perforating them with bone awls or crab claws (Henshilwood et al. 2004; see Figure 1). From 50,000 years ago, beads constructed from ostrich eggshell were traded across the breadth of Africa (Miller and Wang 2022). A quick internet search provides dozens of contemporary examples you can buy right now. In doing so you would, in a sense, join an ancient tradition.

Ancient beads are taken to be a window into our ancestors' lifeways, sociality, and minds (Botha 2008). They are evidence, it has been claimed, that their ancient makers were (in all the ways that matter) just like us: social, emotional, intelligent, moral, aesthetic, and linguistic beings (Henshilwood and Dubreuil 2011). How could some ages-old shards of shell license such dramatic inferences? How do we go from manufactured shells to human nature? Such questions carry major inductive risk as such stories inform our conceptions of ourselves. Much of the philosophy of paleoanthropology has addressed epistemological questions of this kind.

But cognitive paleoanthropology's epistemic status isn't its only philosophically interesting feature. Cognitive paleoanthropology probes what it means to be and become human. Prehistoric beads are part of a material record that has driven a revolution in our understanding of how intelligent, sentient, and social beings like ourselves evolved. Various properties associated with human-like cognition—artistic flair, complex technological innovation, and the collection and modification of pretty shells—pop up throughout thousands of years of African occupancy (e.g., McBrearty and Brooks 2000).These signals are not limited to our particular species: the fossil, archaeological, and molecular records have revealed that our ancestors shared the globe with at least six other species of hominins during the Pleistocene—people like us in many relevant respects (Galway-Witham et al. 2019). The traditional hallmarks of humanity, then, have a deep evolutionary history and are spread across a range of hominin cousins. Philosophical claims about our nature, and natures like ours, can be informed and inspired by the evolutionary, cultural, and cognitive pasts revealed by cognitive paleoanthropology.

These two tasks—analyzing the epistemic prowess of cognitive paleoanthropology and bringing our evolutionary history into dialogue with philosophy—are intimately related. Getting a good grip on the epistemology of paleoanthropology is not only preliminary to fostering a productive interdisciplinary dialogue, but also holds the potential to expand the methodological and conceptual scope of philosophical practice. And further, it can produce unexpected opportunities for conceptual surprise. Our aim is to tackle these tasks in turn: in sections 2 and 3 we identify some of the inferential strategies and conceptual issues involved in bringing the material record to bear on understanding the evolution of our species, then in sections 4 and 5 we consider how cognitive paleoanthropology and philosophy can inform each other more broadly.

Before we begin, a note on disciplinary nomenclature. Understanding the evolution of hominin cognition is a multi-disciplinary practice, and as such it has been called many things: 'cognitive archaeology', 'paleoanthropology', 'evolutionary anthropology', and so on. None quite fit our purposes. At base, our target is the study of the evolution of hominin cognition—that is, the cognitive variety and faculties of the complex lineage leading from our last common ancestor with

Pan—as it is explored through the archaeological and paleontological record. We've thus settled on *cognitive paleoanthropology*, perhaps somewhat idiosyncratically, to highlight aspects connecting the material record with our cognitive pasts.

2. From shells to symbolism to syntax: the shape of an inference

Recall the shell beads introduced in the previous section. According to one influential team of archaeologists, an assemblage of 41 perforated *Nassarius kraussianus* shells (Figure 1) uncovered at Blombos Cave, South Africa—and dated to roughly 75,000 years ago—are evidence of modern symbolic behavior and fully syntactic language (Henshilwood et al. 2004; see also d'Errico et al. 2005; Henshilwood and Dubreuil 2009, 2011). We'll follow their reasoning and use it to analyze inferences in cognitive paleoanthropology.

Henshilwood and colleagues begin by demonstrating that the shells were beads; they were strung and worn as personal adornments. This involves ruling out alternative explanations of the shells' deposition (behavior of natural predators, accidental human transport, etc.). Blombos Cave is many kilometers away from where the snails lived, and the collection contains only mature adult shells rather than a naturally occurring age-range. Thus, deliberate collection and transportation are extremely likely. Microscopic analysis of the shells distinguishes their perforations and other modifications (e.g., flattened facets) from naturally occurring patterns. Their profile is consistent with the friction expected from beads: rubbing against thread, clothes, and other shells. Replication experiments with simulacra of bone tools utilized by the inhabitants of Blombos Cave produced similarly perforated shells. Additionally, ochre residues were detected, revealing that the beads, or the materials they were rubbing up against, were colored a striking red.

Henshilwood et al. argue that, due to being personal adornments, these beads establish unambiguous symbolically mediated behavior 75,000 years ago. From this, they infer fully syntactical language as an essential prerequisite for symbolically mediated behavior: language is required to "share and transmit the symbolic meaning of beadworks" (p. 404). Given these premises, Henshilwood and colleagues infer that the shells are therefore evidence of fully syntactic language 75,000 years ago.

Philosophers have dubbed this strategy *minimum-capacity inference* (Currie and Killin 2019)[1]. If symbolic behavior is necessary (or very likely necessary) for bead production and adorning use, and if we can show that the Blombos Cave beads are adornments, then they are strong evidence for symbolism as well. If such links can be forged between material remains and cognitive

[1] There is disagreement between the authors regarding how to best characterize minimum-capacity inferences: [anonymous] and [anonymous] think modus ponens/tollens captures the basic inferential structure (although not the justification for the inference, which typically relies on inductive reasoning), [anonymous] thinks that this doesn't do justice to archaeological practice, preferring an IBE structure, [anonymous] and [anonymous] think that practitioners' writing sometimes oscillates between the two readings, moving from "necessarily" to "potentially" as objections are raised to their inferences.

capacities, then they can be used to piece together a picture of our cultural and cognitive evolution. However, such links often prove extremely complex.

Rudolf Botha (2008, 2010, 2016) analyzes Henshilwood and colleagues' inferential pathway (Figure 2), pointing out that each step requires some reason for thinking that the inference is empirically informed or theoretically constrained. Botha argues that while Henshilwood et al. may have adequately explained the move from shells to beads, the same cannot be said of later inferences in the chain. He challenges the core propositions that the beads must be adornments, that symbolic behavior is required, or very likely required, for producing adornments, and that fully syntactic language is required, or very likely required, for symbolism. Botha generates alternative hypotheses by reaching for empirical and theoretical considerations from anthropology, linguistics, and elsewhere. For example, items like beads are not necessarily utilized for adornment (think of abacuses) (Coolidge and Wynn 2011). Even if the Blombos shells were adornments (they most likely were, as current consensus indicates; see section 3), beads are not automatically symbolically imbued (Wadley 2001, 2011): their use could index group membership in a non-symbolically mediated way. And the expressive power of grammatically simple (non-fully-syntactic) linguistic communication puts pressure on the claim that syntax is necessary for symbolism (Botha 2016, pp. 49-51). Botha cites Gil's analysis of Riau Indonesian—one of many varieties of colloquial Malay/Indonesian and spoken by millions of people—as evidence of a grammatically simple language that lacks distinct open syntactic categories like adjectives and verbs, and yet enables the expression and comprehension of complex semantic content (Gil 2008a, 2008b, 2010).

So, debates driven by minimum-capacity inferences encourage empirical and theoretical focus on particular inferential steps and the generation of alternative interpretations. This involves asking deep philosophical questions about the nature of cognition, intentionality and sociality, questions which play out in rich dialogue with the materiality of the record.[2] The Blombos shells anchor and constrain debate about the relationship between language and symbolism.

Understanding the Blombos shell beads requires understanding the relationships between tool-use and ornamentation, sociality and symbolism, language and artifacts, minds and materials. This requires complex inferential strategies demanding philosophical analysis. These include the character of the inferences used in the field (Currie and Killin 2019; Pain 2021), the role of 'bridge' (or 'midrange') theory (Botha 2016; Currie 2018), the methods of inference by minimally required capacities (Wynn 1979, 2002; Killin and Pain 2023a) or by causal associations (Currie and Killin 2019; Killin 2021), interpretive biases, including widely-held disciplinary assumptions (Lequin 2018; Gero 2007), the inheritance of problems pertaining to particular theories used to provision an inference (Killin and Pain 2023b), and the extent to which past materials can be taken as a 'simple reflection' of genetically endowed cognitive abilities (Sterelny 2011, 2017).

[2] This includes researchers at least implicitly endorsing various background commitments in the philosophy of psychology and cognitive science, but increasingly engaging in more direct discussions, for example, about representationalism versus enactivism, the extended mind hypothesis, material engagement theory, intentionality, and so on (see, for discussion, Currie and Killin 2019; Killin and Pain 2023a; Malafouris 2019; van Mazijk 2024; see also section 5 of this paper).

Figure 1. Perforated *N. kraussianus* beads from the Middle Stone Age of Blombos Cave. Scale bars, 5 mm. Figure taken, with permission of the American Association for the Advancement of Science, from Henshilwood et al. (2004).

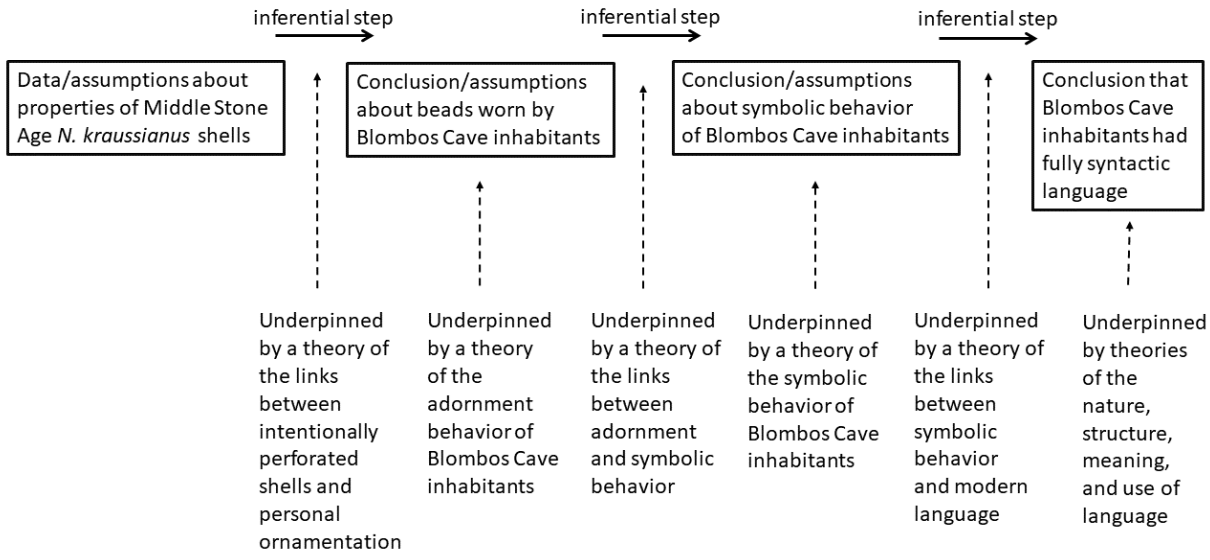


Figure 2. The 'Blombos inference', from shells to symbolism to syntax, recreated from the work of Botha (e.g., 2010, 2016).

3. Underdetermination and causal association

As we saw with prehistoric shells, cognitive paleoanthropology relies on analysis of 'traces': extracted materials forming a record that evidences our evolutionary cognitive past. These records are patchy and incomplete. One immediate consequence is that the earliest-known material traces of a behavior/activity do not necessarily reflect the earliest expressions of the relevant cognitive traits. Earlier expressions may not have led to known, preserved traces—they may be archaeologically invisible. But there's more. The incompleteness of the record and the inferential leaps required to get from material remains to cognitive capacities underwrite a diverse range of epistemic challenges and associated strategies, but also provide an anchor for thinking deeply about the nature of those remains in productive, surprising ways.

Philosophers often characterize the patchiness of historical records in terms of *underdetermination* (Turner 2005, 2007; Currie 2021). Underdetermination describes situations where we have insufficient evidence to decide between hypotheses. In the context of cognitive paleoanthropology, we often face *local* underdetermination: here, *available* evidence is insufficient for determining which hypothesis should be preferred. Besides the paucity of the material record, significant underdetermination problems are also posed by insufficiently constraining theory and available technological and analytical resources (Currie and Killin 2019). Perforated shells don't equal beads (they could have been manufactured for other purposes),

beads don't equal symbolically mediated behavior (they could index group membership), and symbolically mediated behavior doesn't equal syntax. Considered in isolation, Henshilwood and colleagues' interpretation of personal adornments as straightforward proxies for symbolically mediated behavior reflected what was then a common (though not uncontroversial) assumption about what prehistoric ornamentation reveals, or very likely reveals, which Botha challenged.

However, when not considered in isolation, but as part of a larger repertoire of materials associated with ancient humans—musical instruments, statuettes, and cave paintings, for example—the shell beads, ochre, and other traces of Paleolithic personal ornamentation highlight the deep importance of (let's call it) 'proto-aesthetics' to the human lineage. The time and effort ancient foragers invested into collecting, transporting, and modifying the materials (time that could have been spent on more utilitarian pursuits) demands explanation. Beads, in the absence of other signals of symbolism, are one thing; the absence of symbolic thinking is harder to maintain when those beads are combined with traces of many other potentially symbolic behaviors (see d'Errico et al. 2023 for an updated, multistep scenario for the origins and evolution of personal ornamentation, and the acquisition and complexification of symbolic functions). If this holds, demonstrating a fairly strict connection between beads, adornment, and symbolism becomes somewhat less of a requirement for licensing the inference (especially in light of the increasingly complex picture of human evolution, see below). These conclusions reflect a different strategy of inference, *causal-association* inference (Currie and Killin 2019). Causal-association inferences draw on multiple lines of independent evidence to underwrite an association between material trace and cognitive capacity. These associations are then tied together into larger contexts: relying more on a logic of coherence than establishing pre-requisites as we see in minimum-capacity inference. However, these two inferential strategies are not in competition; archaeologsts often leverage them together to gain inferential reach into distinct aspects of the same phenomenon.

In light of evidential paucity and the complex inferences involved, cognitive paleoanthropologists adopt what has been called *methodological omnivory* (Currie 2015, 2018): they employ multiply-pronged, pluralistic and opportunistic strategies. In defining shells as ornamental beads, Henshilwood et al. drew on taphonomic analysis (analysis of processes affecting past traces such as degradation, alteration, or displacement), perforation techniques, and microscopic analysis of use-wear patterns to exclude unintentional modification of the shells and to argue that traces are consistent with rubbing against thread, clothes, and other shells. Such studies often rely on putting the material record in dialogue with other instances of an artefact type: samples of Late Stone Age shells, recently harvested modern shells and experimentally modified shells are used for comparative analysis. This approach often involves developing studies on contemporary analogues: this includes replicating the structures and methods applied in the past through experimental archaeology (Flores 2011; Bell 2014; Currie 2022).

Underdetermination is often *nested* (Turner 2019; Currie and Meneganzin 2022). Once we can contrast and discriminate between broader forms of uncertainty (say, between accidental modification and accumulation vs. manufactured beads), we gain access to narrower and more specific contrasts (beads evidencing syntactic language or otherwise). Even if we'll never be able to identify the exact meanings or the computational processes implemented in the minds of our

bead-wearing ancestors, we might nonetheless infer that the beads carried value in ancient social worlds. Further, understanding and pushing the limits of these inferences also requires mapping the possibilities inherent in ancient human lifeways: this 'embracing of ambiguity' (Gero 2007) too is an epistemic achievement.

Moreover, these practices point to the importance of *materiality* in cognitive paleoanthropology. Philosopher Alison Wylie and archaeologist Robert Chapman argue that the material record acts as an intransigent 'point of resistance' to archaeological presuppositions (Wylie 2002; Chapman and Wylie 2016), anchoring historical speculation in cognitive paleoanthropology to a concrete past. A focus on materiality—the paleontological and archaeological record—should also lead us to scrutinize the categories we use when dealing with ancient materials. When looking at a pierced shell or a sculpted bone, we are already drawing delineations between what is and what is not culture, or cognition, or modernity, and what can or cannot be recognized as fully human on that basis (see, for instance, Shea 2011; Meneganzin and Currie 2022). Thus, in addition to understanding inferential structures, philosophical work making sense of the conceptual landscape is called for: when paleoanthropologists appeal to notions and categories like 'species', 'Neolithic' and 'behaviorally modern', how should these be conceptualized and how do they shape investigation and interpretation?

Problems of underdetermination do not only plague particular links between the material record and cognitive capacities. They also arise for hypotheses positing particular processes of evolution or development in the past, a form of underdetermination often called *equifinality*. As we'll see in the next section, different evolutionary processes may explain the increase in technological sophistication and complexity observed from around 100,000 years ago. This includes the fixation of a lucky constellation of genes (Klein 2019), environmental and climatic changes affecting population size, density, and interconnectedness (Powell et al. 2009), and cumulative cultural evolution (d'Errico and Stringer 2011). Because multiple processes could explain the emergence of the outcome, discriminating between them (or combining them) is challenging.

Further, it is not difficult to see how values, biases, and the historical context of research (as well as the identity of who gets to do research) can influence classification practices and the conceptual toolkit of paleoanthropology. These can offer additional entry points for philosophical intervention. Regarding the notion of 'behavioral modernity' (see next section), a fundamental Eurocentric bias has been exposed over the past twenty years. Shea (2011) suggests the ironic thought-experiment that if the first archaeologists had been Polynesians, the important hallmarks we would rely on to define behavioral modernity would include celestial navigation skills, ocean-going watercraft, pelagic fishing and hunting marine mammals, horticulture, domesticated pigs and dogs, ceramics, and feather cloaks. And perhaps Polynesian prehistorians would have regarded cave art, beads, carved antler tools, and other hallmarks of the European Upper Paleolithic production as idiosyncratic local phenomena of no obvious evolutionary significance.

Overall, much philosophical work is to be done characterizing the nature, limits, and value of the inferences characteristic of cognitive paleoanthropology. There are clear opportunities here for philosophers of science interested in the nature of inference, scientific progress, pluralism, and related issues. We have here a rich trove of examples of explanations, descriptions, and

inferences. But of interest to philosophers are also the results of cognitive paleoanthropology: in particular, the changing shape of how humans became human.

4. Where we came from

Complex strategies tackling the ambiguity of the archaeological record have led to increasingly complex stories about the evolution of our minds. Let's switch from epistemic issues to what the material record tells us about ourselves, and how this might inform philosophy.

In philosophy, "Human nature" is a much-debated notion (see, for example, Hull 1986; Machery 2008, 2017; Ramsey 2013, 2023; Kronfeldner et al. 2014; Kronfeldner 2018; Barrett 2018; Downes 2018; Sterelny 2018; Driscoll 2024). And the same goes for innateness (e.g., Griffiths 2002; Griffiths et al. 2009; Mameli and Bateson 2006, 2011; Bateson and Mameli 2007; Mameli 2008; Ariew 2007; Linquist 2018). This work rarely engages directly with what the material records and paleoanthropological practice might tell us about our nature and, we think, revolutions in paleoanthropological understanding have potential consequences for our philosophical understanding.

A flash-point of philosophical and empirical debate concerns the extent to which human-like cognition relies on biologically 'innate' capacities, drives, and biases. In parallel to this philosophical debate has been cognitive paleoanthropology's increasing understanding of 'behavioral modernity'. Our lineage became *anatomically modern*, that is, showing the basic skeletal pattern of recent human populations, around 250-300 kya. Yet the material package associated with complex human sociality, imagination, and creativity—shell beads for instance—were long thought to only arise in Europe 50-40 kya. This mysterious gap led to the idea that some genetic mutation around that time supercharged human minds. However, in the last 25 years or so, the length of that gap, the pattern of the material records associated with behavioral modernity, and its phylogenetic spread, have been transformed with revolutionary upshots for our understanding of how humans became human, an understanding which matters for how innate we take these qualities to be, and indeed which qualities we care about.

Empirical evidence has progressively undermined the idea that behavioral modernity arose due to a genetic mutation (McBrearty and Brooks 2000; Sterelny 2011; Colagè and d'Errico 2020). No species-wide genetic sweep preceding the purported breakthrough has been found (Mallick et al. 2016). Indeed, archaeology has slowly revealed a much messier pattern, characterized by the uncoordinated appearance (and disappearance) of relevant innovations. The search for the earliest known Eurasian traces of sophisticated cognitive (including 'proto-aesthetic') abilities takes us to the caves in Spain where paintings older than 64,000 years—and therefore potentially of Neanderthal origin—predate the known arrival of modern humans in Europe (Hoffmann et al. 2018, but see White et al. 2020 for criticism). It takes us to the Krapina Neanderthal site in Croatia, where modified white-tailed eagle claws are claimed as evidence for Neanderthal jewelry some 130,000 years ago (Radovčić et al. 2015). It leads us to Bruniquel Cave in southwest France, where constructions made of broken stalagmites, dating from 176,000 years ago, raise many

questions about the symbolic behavior and social organization of Neanderthals (Jaubert et al. 2016). All these archaeological remains suggest that cultural productions occurred in Eurasia well before *H. sapiens* arrived (potentially dating back to 54,000 years; Slimak et al. 2022).

However, there being no hardwired cognitive-first explanation doesn't mean that no cognitive story is to be told (Pain 2021). That is, we may still want to make inferences about the cognitive capacities of ancient makers and how these were shaped by changing material worlds. The challenge here, taken up both by philosophers and paleoanthropologists, is to leverage multiple lines of evidence to illustrate an empirically informed co-evolutionary scenario, in which cognitive capacities, socio-demographic niche, and materials interact with each other (Lombard and Högberg 2021; Sterelny 2012; 2021; Sterelny and Hiscock 2024).

Further, the picture of how we became human has become multi-species. Increasing evidence of gene flow among distinct hominin lineages (notably, between us, the Neanderthals, and Denisovans: see Green et al. 2010; Bergström et al. 2021) has inspired discussion on how to update models of our origins and evolution. A pattern of admixture may well be at the origin of our own species (Scerri et al. 2018, but see Meneganzin et al. 2022 and Ragsdale et al. 2023). This has consequences for how we understand ourselves and our origins. For instance, some argue that admixture should lead to the rejection of taxonomic delineations between ourselves and Neanderthals (for review, see Meneganzin and Bernardi 2023). Others argue that we should see Neanderthals not as inferior to *H. sapiens*, but as 'cognitively indistinguishable' (Villa and Roebroeks 2014; Wynn et al. 2016 for criticism). Either way, these discoveries carry important consequences for understanding Neanderthal extinction (Currie and Meneganzin 2022). Alongside evidence of admixture, as we've noted, many markers of behavioral modernity are shared by Neanderthals, and the classification and attribution of material evidence to hominin makers is made truly complex by the picture of coexistence and interaction between hominin populations in Eurasia.

As more evidence is uncovered and more questions arise, increasingly complex narratives of hominin cognitive evolution are taking form. For instance, some recent accounts claim that transmission strategies and intergenerational social learning played a key role in conserving and accumulating innovations (Sterelny 2011; Colagè and d'Errico 2023). These models of behavioral modernity do not ask after some magic moment where the requisite capacities snapped into place, but instead ask after the demographic and pedagogical requirements for cultural innovations' maintenance and accumulation (Meneganzin and Currie 2022). That is, behavioral modernity might be a—potentially reversible, in its earliest stages—*threshold effect* wherein the biology of our species plays an enabling role, but it is the social processes of demography and pedagogy that made us human. This appears well exemplified by the occurrence of Levallois technologies (the production of blades and bladelets) in the African Middle Stone Age—another classic marker of modern behavior. These show a complex archaeological signal, with early spurs of innovation dating to the dawn of our lineage (or perhaps as early as 500 kya, Wilkins et al. 2011), subsequent loss, and cyclic reinvention in various regions of Africa (d'Errico and Stringer 2011). This pattern is plausibly explained by the erosion of favorable population density conditions and social dynamics, resulting from pulses of depopulation and repopulation due to fluctuating

ecological circumstances rather than the loss of biological prerequisites for, say, manual dexterity and motor control.

So, in sum, if you want to know what made humans *human*, then understanding the record is a must. And if you want to understand human-like capacities (intelligence, affect, creativity, and so on), then the record reveals a multi-faceted, complex story about their evolution. The upshot is this: engagement with the record informs our understanding of our cognitive, behavioral, and social traits. However, there are no simple answers—the record reveals that becoming human was a very long process that was spread across a variety of human species. Any claims about the innateness or otherwise of the bundle of traits often identified as constituting 'human nature', must be made against the backdrop of this complex evolutionary history although see Ramsey 2023 for an account of human nature tied to extant humans only)

5. Paleoanthropological Philosophy

Surveying the tangled inferential webs across sections 2 and 3, one might despair of cognitive paleoanthropology's capacity to tell us much of anything philosophers can use. However, we don't think the complex strategies and challenges outlined above provision a council of despair. Rather, revealing this complexity indicates the surprising effectiveness of the discipline in generating new knowledge despite challenging epistemic circumstances. This is not limited to wresting empirical results from the clutches of time and its corrosive effects on the record. Cognitive paleoanthropology is also a source of novel theoretical perspectives. For one thing, remembering Chapman & Wylie's emphasis on materiality, generating new hypotheses about what kinds of cognitive capacities are capable of producing which features of the material record can be remarkably generative of new ideas about cognition, sociality, and culture (for example, see Wynn and Berlant 2019 for a discussion of the 'aesthetic' features of Acheulean stone tools). So, where are the connections between philosophy and paleoanthropology: that is, how can paleoanthropology feed into philosophical questions? In this section, we'll mention a few ways—but we think the interconnections are potentially open-ended.

Over the last twenty years, many philosophers of mind have insisted that accounts of cognition and affect should reach beyond the brain's boundaries: the mind is embodied, situated and extended. The story of human evolution, too, is not one of brain-bound cognition alone (Antón and Snodgrass 2012). The discovery of the first fossil australopithecines in South Africa (Au. *africanus*) and later of the older *Au. afarensis* in East Africa demonstrated that hominins were first bipeds, and only became large-brained 2-3 million years later, and only later still evolved many of the distinctive cognitive abilities associated with modern humans (cf. Washburn 1951). Although bipedalism emerged well before upgrades in cognition beyond the great ape grade (and indeed, like our cognition, appears to have evolved in a messy, complex way), it plausibly provides crucial pre-conditions for our cognitive evolutionary path (Jeffares 2014; Falk 2016). The human hand, with its remarkably dexterous digits and grip mechanics, can only be understood in light of increasing specialization in tool use and the relevant cognitive machinery: but so also that cognitive machinery cannot be understood in isolation from hand anatomy and functional morphology. If cognition is embodied and extended, so too is its evolution; the emphasis on the

coupling of morphological and cognitive evolution potentially bolsters those philosophical models of cognition.

Cognitive paleoanthropologists develop studies on contemporary analogues, studies which themselves can matter for issues exercising some philosophers. One fascinating example is the burgeoning field of neuroarchaeology. Here, imaging techniques are used to assess what happens in a modern human subject's brain during stone toolmaking tasks. Stone tools were produced by ancient hominins from around 3.3 million years ago (Harmand and Lewis et al. 2015), throughout the Pleistocene (i.e., the Oldowan, Acheulean, and Mousterian industries: see Table 1) and onwards, so they are a major evidential source for evolutionary theorizing. This method has been put to work in the evolution of language (e.g., Putt 2019; Stout and Chaminade 2007, 2012). Here, considerable overlap has been demonstrated between the areas of the modern human brain co-opted during some stone toolmaking tasks and those co-opted during modern language production (e.g., Stout et al. 2008, 2015). This lends weight to the hypothesis that language evolution was scaffolded by existing cognitive resources developed for much older behavioral traits like knapping ('tool-language coevolution', Pain 2023).

Further, by linking the production of language with manual praxis, tool-language co-evolution connects with a prominent tradition in 20th century philosophy of language. Planer and Sterelny (2021: pp.150) highlight linguistic pragmatics, particularly Austin's helpfully titled *How To Do Things with Words* (1962). According to tool-language co-evolution, language is treated as a species of complex intentional action: our ability to do things with words is an elaboration of a more ancient ability to do things with tools. The potential evolutionary link between manual praxis and language has also attracted attention from political philosophers interested in the role of labour in human social systems, notably Engels (1876/1963). On an epistemic note, however, cognitive paleoanthropology's use of (and neuroarchaeology's reliance on) studies of modern humans also makes it beholden to critical discussions. These include neuroarchaeology's typically homogeneous pool of participants (Killin and Pain 2023b), but also the use of ethnographic analogies in paleoanthropological theorizing (taking ethnographically-recorded hunter-gatherer groups as models or windows into the past)—to gain insights into worlds that might have well been shaped by different constraints and motives (Spikins et al 2017; Page and French 2020)—as well as philosophical discussions on the local license of analogies (Wylie 1985; Currie 2016; Sterelny 2022).

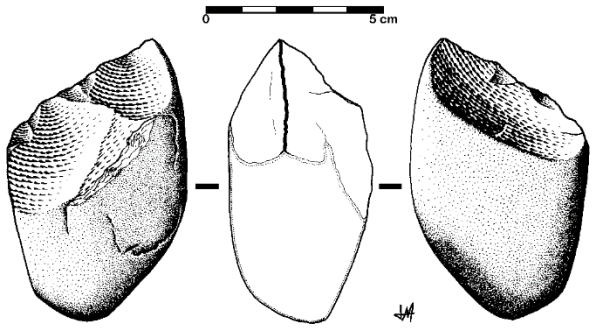
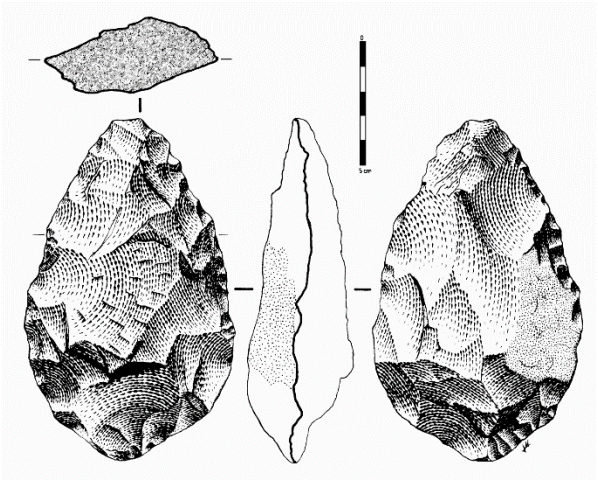
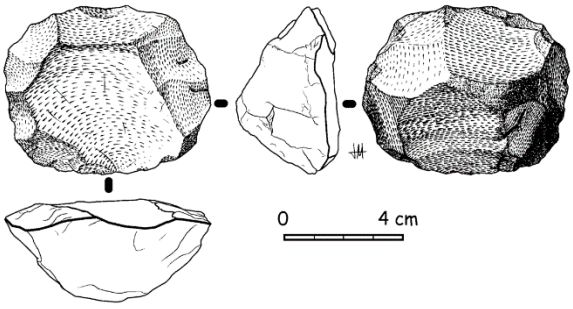
Stone tools at a glance
 **Oldowan chopper.** Source: José-Manuel Benito Álvarez (Wikimedia). Reproducible under the Creative Commons Attribution-Share Alike 2.5 Generic license
 **Acheulean biface (handaxe).** Source: José-Manuel Benito Álvarez (Wikimedia). Public domain
 **Mousterian Levallois (prepared core) tool.** Source: José-Manuel Benito Álvarez (Wikimedia). Reproducible under the Creative Commons Attribution-Share Alike 2.5 Generic license.

Table 1. Examples from the Oldowan (from 2.6 mya), Acheulean (from 1.8 mya), and Mousterian (from 160 kya) stone tool industries. According to neuroarchaeological research, complex tool production (from the Acheulean onwards) implicates neural structures also utilized in language in modern humans (e.g., Stout et al. 2008, 2015).

The interdisciplinary engagement mentioned above is not one-way. Cognitive paleoanthropologists have sometimes drawn on philosophical theories, alongside empirical data, in order to provision particular inferences. For example, Tomasello and colleagues' (2012) work on collaborative hunting uses empirical findings to draw conclusions about the emergence of human cooperation, which in turn is interpreted via Michael Bratman's work on joint action, which is leveraged to make claims about hominin cognition around 800 kya. Tomasello combines this framework with data on children and great apes to develop a broader hypothesis about the evolution of shared intentionality, which incorporates Bratmanian joint action, imitation, and Gricean communication, and in turn drives inferences about biologically inherited, adaptive features of human cognition (Tomasello 2020). It's worth emphasizing just how much philosophical theories are used to license strong claims, aside from the empirical data. And this generates philosophical interest and critique because, naturally, the philosophical theories adopted are controversial (see, e.g., Butterfill 2012; Moore 2017). Interdisciplinary engagement is thus an exciting avenue for developing such research further, but if philosophers are to engage, they will need to be familiar with the paleoanthropological literature. Debating whether, for example, Bratmanian joint action is very likely required for collaborative spear hunting—or whether Boeschian joint action would suffice (see Blomberg 2015)—requires careful readings of the empirical literature.[3]

In addition to suggesting new avenues for philosophical research, cognitive paleoanthropology can offer new vistas on traditional questions of interest in the history of philosophy. The notions of 'alterity', 'otherness', and reflections on intersubjectivity, for instance, have been at the foundation of much work in the phenomenological tradition. Thinking of these in light of the ongoing re-negotiation of the place of Neanderthals and other hominin ancestors in human evolution—especially in relation to us—can reformulate in new, exciting terms well-known questions of identity and difference rooted at the origins of Western philosophy (and much later epitomized by structuralist and poststructuralist traditions). Cognitive paleoanthropology also provides an opportunity to reconsider the concepts of philosophical anthropology, a field stemming from the phenomenological tradition that has sought to clarify what it means to be human, based on knowledge of human evolution. Building on this momentum, recent research on the specificities of human life-history (Gunz et al. 2020), for example, can help reframe thinking on the link between the comparatively early birthing (of helpless babies) and prolonged development in our lineage, and socio-cultural evolution, as elaborated by representatives of philosophical anthropology such as Blumenberg (2006). Other examples may include novel articulations of philosophical questions regarding biological individuality and individualization, which can be inspired by a close engagement with paleoanthropological practice and debates on the delineation of fundamental units of analysis, such as 'traits', be they related to morphology, life-history, or cognition (Meneganzin et al. 2024). Such examples of how philosophy has drawn on paleoanthropology are useful for thinking about the conditions under which this interdisciplinarity can best take place. The need for epistemic credentials, but also for an overall

[3] This paragraph is in large part due to the suggestions of an anonymous referee, whom we gratefully acknowledge especially for engaging us on these issues so constructively.

assessment of the field (rather than selecting specific hypotheses in support of philosophical speculations) are of particular importance here.

We'll close with a tantalizing thought: philosophical methodology can benefit greatly from interaction with cognitive paleoanthropology. Those sciences expand the notion of cross-cultural variation beyond extant societies and into the deep past, perhaps raising questions of philosophical methodology, and our own discipline's long held assumptions.

Typically philosophy deals in concepts, and concepts are cultural. We are now starting to appreciate how deeply cognition and culture are intertwined, and engagement with our cultural and cognitive evolutionary past is integral to this task. A now-familiar complaint about conceptual analysis in philosophy is its reliance on intuitive judgments of trained philosophers: the concepts undergoing analysis come almost entirely from a biased and idiosyncratic (WEIRD) sample set. And as recent results from experimental philosophy have shown (and as any anthropologist would likely tell you), there is going to be significant cross-cultural variation with respect to many of these concepts—yet their analyses are often expressly intended or assumed by philosophers to generalize (e.g., Kripke 1977). It is thus hard to see how conceptual analysis, as standardly practiced, could produce the *general* concepts (transcending cultural context) that philosophers often appear to be after. Given cross-cultural variation, then, what we get are claims about what justice is, or what consciousness is, according to mostly WEIRD thinkers. Do your conceptual analysis in non-WEIRD places, taking seriously non-WEIRD intuitions, and you'll get a different set of results (e.g., Stich and Machery 2023; Sękowski et al. 2023).

Experimental philosophers urge us to expand our conceptual scope to include a more representative set of human perspectives, thus increasing the robustness and diversity of our analyses. Cognitive paleoanthropology, potentially, could expand this into deep time. For instance, anthropology tells us that musicality is rarely divorced from movement in most human cultures, and this matters for a philosophical account of music (Currie & Killin 2016). The earliest known musical instruments are around 40,000 years old (Morley 2013) and plausibly musical behaviors and cultures are much deeper (Killin 2024). What roles did music play in those earlier cultures? How did they think about music? Moreover, given our emphasis on proto-aesthetic sense and practices, what would such a sense in Neanderthals look like? If some grip can be had on these questions, these could inform our philosophy of music by providing a wider base for testing conceptions, and potentially generating new perspectives on what music might be.

Besides analysis, and conceptual analysis in particular, there is another dimension in which philosophical methodology can benefit from engaging with practices and problems in cognitive paleoanthropology. While analysis and synthesis are correlative procedures in philosophy, contemporary analytic philosophy emphasizes the former at the expense of the latter, arguably renouncing some of its creative and constructive potential. After analyzing the inferential strategies used by paleoanthropologists, with their limits and promises—as seen in sections 2 and 3—and the various evidential strands thus produced, weaving these together in coherent evolutionary narratives is a means of readmitting synthesis to the philosophical toolkit (Sterelny's *Evolved Apprentice* is a particularly influential example). This point however clearly implies a redefinition of the notion of 'synthesis' as traditionally understood, here linked to the opportunity

to critically draw from the work of a range of disciplines to build narrative explanations of human evolution that postulate causal connections between historical data and events, potentially achieving novel theoretical unities.

No doubt we're writing big checks here, and only time will tell whether they'll clear, but not only is there great potential for the epistemology of cognitive paleoanthropology, but for a philosophy informed by paleoanthropology as well.

6. Conclusion

In this short paper we've attempted to lay out the promise and potential of the philosophy of cognitive paleoanthropology. The evolution of human cognition has been revolutionized by engagement with the material record: traces of past tools, lifeways, bodies, and ornamentation. Much philosophical work remains to be done in understanding the forms and license of such inferences and explanations, developing synthetic accounts of emerging evolutionary narratives, and understanding the consequences of this new knowledge for our understanding of intelligence, sociality, and human nature.

We hope that philosophers interested in questions at the intersection of anthropology and evolutionary biology will not only see the potential arising from a close engagement with cognitive paleoanthropology but will increasingly come to consider it as crucial, and that those not working in the immediately adjacent fields will nonetheless discover exciting opportunities for perspectival changes on longstanding philosophical challenges or, perhaps, find inspiration for entirely new ones.

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