

CLOTHING AND MODERN HUMAN BEHAVIOUR IN AUSTRALIA

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ABSTRACT

Recent reviews have highlighted the challenges posed by the Australian archaeological record for the concept of modern human behaviour. The archaeologically-visible components make only a limited, sporadic and generally delayed appearance in Australia, despite the presence of modern humans on the continent from 45,000 years ago. It is suggested here that some key aspects of modern human behaviour relate to the use and manufacture of clothing for thermal reasons, and that by connecting some components to the manufacture and repercussions of clothing, their fluctuating occurrence can be linked to varying environmental conditions throughout the late Pleistocene, and earlier. One region of special interest for the debate is Tasmania, where certain signs of behavioural modernity (bone tools, resource specialization, novel lithic technology and, briefly, cave art) emerged during the Last Glacial Maximum, only to diminish or disappear during the Holocene. It is argued that a clothing-based model of modern human behaviour is more viable than existing formulations not only in Australia but perhaps globally.

INTRODUCTION

The concept of behavioural modernity as a “package” of traits that accompanied the spread of anatomically modern humans out of Africa has been challenged by reviews of the Australian archaeological record (Brumm and Moore 2005; O’Connell and Allen 2007; Habgood and Franklin 2008). Indeed, despite the presence of anatomically modern humans in Australia for at least 40,000 years, archaeological evidence of behavioural modernity prior to the mid-Holocene is patchy and generally weak. Moreover, with the notable exception of late Pleistocene Tasmania (discussed below), there is little discernable trend for an accumulation or coalescence over time of the various proposed elements of the package; rather, the few identifiable elements make a sporadic (and often transient) appearance at widely dispersed times and locations across the continent.

In this paper, it is suggested that some of the archaeological markers of behavioural modernity may relate to the use of clothing for thermal reasons. The general paucity of archaeological signs of behavioural modernity in Australia (compared, for instance, to Africa and especially Europe) reflects reduced thermal requirements for clothing, with the fluctuating intensity of innovations and developments reflecting — at least in part — the fluctuating environmental conditions that prevailed since modern humans arrived on the continent. Furthermore, similar environmental patterning in some of the key archaeological signs of behavioural modernity is detectable in Africa and Eurasia during the Middle and Upper Pleistocene. To the extent that the varying physiological need for thermal protection in the form of clothing may account for temporal and geographical patterning in some of the archaeologically-visible signs of behavioural modernity, the Australian evidence may constitute a most informative example in this regard.

BEHAVIOURAL “REVOLUTION”?

Focusing on archaeological evidence for “symbolic storage” as an identifying marker of behavioural modernity, Brumm and Moore’s (2005) review examines mainly adornment, art and, to a lesser extent, the emergence of stylized and novel technologies. O’Connell and Allen’s (2007) paper deals primarily with trends in lithic technologies, site utilization and subsistence patterns. In addition to personal adornment, art and technological specialization, Habgood and Franklin’s (2008) more extensive review considers expansion of geographical range and exchange networks, mining and quarrying, intentional burials (with and without grave goods), and intensified exploitation of economic resources. The main findings and conclusions from these reviews are summarized briefly here.

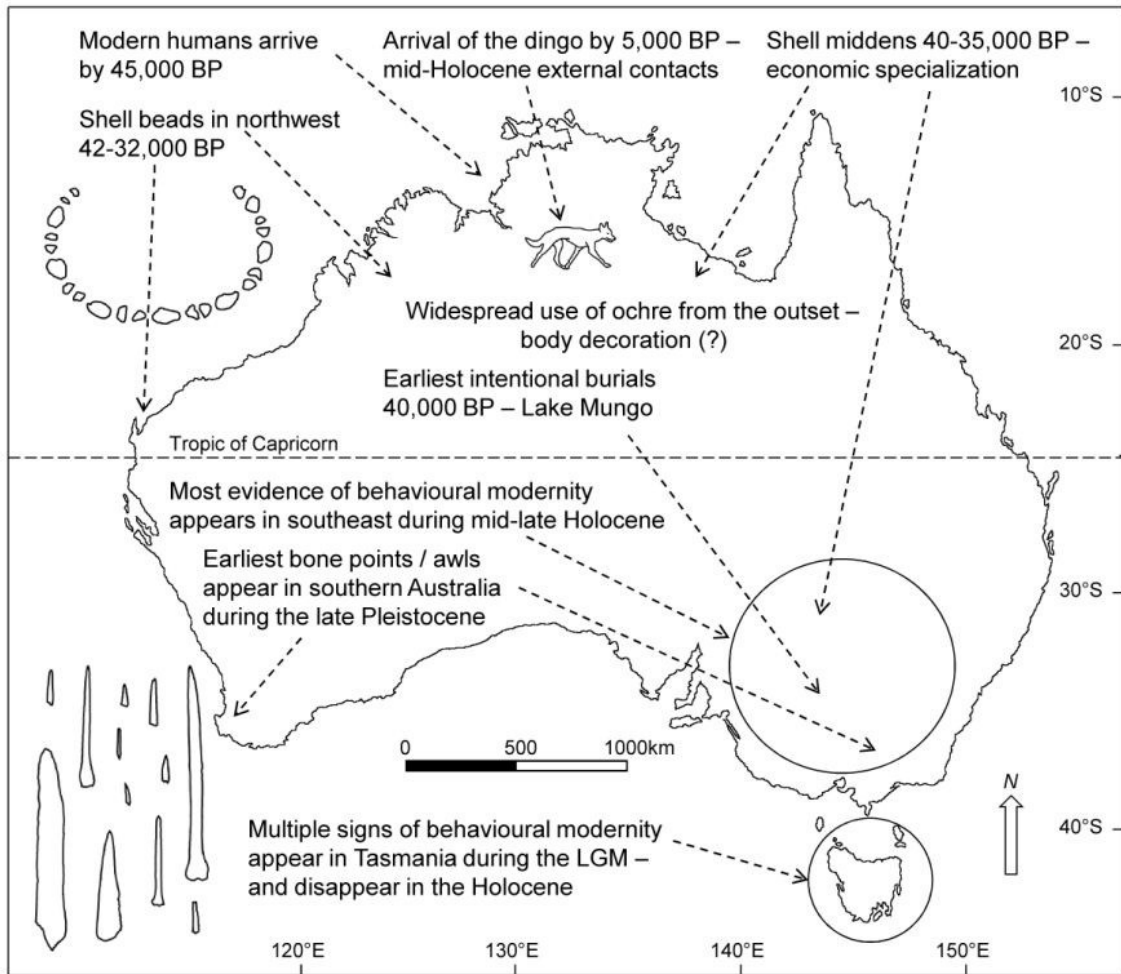


Figure 1. Archaeological evidence for behavioural modernity in Australia.

Limited Pleistocene evidence

While the use of ochre (probably for body decoration, among other uses) is attested at a number of widely-scattered sites virtually from the outset, from around 40,000 years ago (e.g. O'Connor and Fankhauser 2001), Pleistocene evidence for adornment is sparse (Figure 1). The earliest unequivocal evidence comprises shell beads in the Kimberley region in the northwest dating perhaps to as early as 42,000 years ago, and at the Mandu Mandu rock-shelter site on the western coast dating to around 32,000 years ago (Morse 1993). At Devil's Lair on the southwest coast, three bone beads and a perforated stone piece (said to possibly be a pendant) are dated to between 19,000 and 12,000 years ago (Dortch 1984), following the Last Glacial Maximum (LGM). No rock art in Australia can confidently be dated to the Pleistocene, with the possible exception of hand stencils at a couple of Tasmanian cave sites in the southeast (Harris et al 1988; Cosgrove and Jones 1989), for which terminal Pleistocene dates around 10,000 years ago are likely (taking into account the apparent

abandonment of cave sites in the Tasmanian southwest during the early Holocene).

Burials suggesting "established social rules" and "ritual" are estimated to date to around 40,000 years ago at Lake Mungo in the southeast interior of the continent (Habgood and Franklin 2008:201-202), with other burials (mainly in the southeast) dating to the terminal Pleistocene. Expansion of human settlement into more extreme environmental zones is documented in southwest Tasmania spanning the LGM, where cave sites were occupied during markedly cold climatic regimes (Cosgrove 1999; Gilligan 2007a). Also making an appearance in late Pleistocene Tasmania are standardized lithics (thumbnail scrapers) and worked bone tools (points). The latter also occurs at Devil's Lair in the southwest corner of Sahul during the late Pleistocene.

Evidence of economic specialization in the form of shell middens date from 35,000-40,000 years ago, confirming the exploitation of freshwater and marine resources in riverine and coastal environments, although there is little evidence for

associated specialized technologies. In southwest Tasmania, however, targeted hunting of the red-necked (or Bennett's) wallaby (*Macropus rufogriseus*) is well-documented throughout the late Pleistocene, and is associated with lithic assemblages dominated by thumbnail scrapers and, at some sites, bone points.

Mid-late Holocene evidence

Archaeological evidence of adornment becomes more common on the mid-Holocene, with a number of sites in the south and especially the southeast (e.g. Cooma and Lake Nitchie) yielding pierced animal teeth from around 7,000 years ago. These decorative items occur as grave goods at cemeteries from the mid-Holocene, notably at Roonka Flat where they date to around 4,000 years ago (Pate 2006; Robertson and Prescott 2006). Other markers of behavioural modernity become commonplace in the mid-late Holocene, including novel and more standardized tool forms (e.g. backed artefacts) and the majority of shell middens and various other indicators of more specialized or intensive resource exploitation (e.g. fishing technologies such as weirs and shell hooks); more extensive trade networks are also evident, particularly from around 1,000 years ago (e.g. Lourandos 1997:204-243, 300-307; Mulvaney and Kamminga 1999:223-272).

THE "PACKAGE"

Evidence for "symbolic" behaviour in Australia is very isolated during the Pleistocene, which implies that lack of archaeological evidence for symbolism cannot be taken to signify a lack of behavioural modernity (Brumm and Moore 2005:167-169; O'Connell and Allen 2007:405). Similarly, Habgood and Franklin conclude from their broader survey of various possible markers of behavioural modernity in Australia that there exists no unified "package" of "archaeologically visible traits" (Habgood and Franklin 2008:214). Whether an increased frequency of some elements of the "package" may be causally linked to increased population densities — particularly during the late Holocene — is debatable (Habgood and Franklin 2008:215). O'Connell and Allen, for example, conclude that the frequency of archaeological traits of behavioural modernity in Sahul may be largely "an artefact of demography" (which in turn might be driven partly by climatic change), although they concede that this explanation "does not match up well with data from other parts of the world" (O'Connell and Allen 2007:405). Similarly, this factor (population density) would appear less tenable in explaining the emergence — and the subsequent disappearance — of a number of archaeological markers of behavioural modernity in late Pleistocene Tasmania.

Environmental fluctuation?

The sporadic (and sometimes recurring) presence of early markers of behavioural modernity has led some researchers to suggest a link with fluctuating environmental conditions, in Australia and also in other parts of the world (e.g. Hiscock 1994; d'Errico 2003; Henshilwood and Marean 2003; Hiscock and O'Connor 2005, 2006; Zilhão 2007). Any hypothetical links between signs of behavioural modernity and environmental changes are likely to be indirect and regionally variable, with large-scale climatic fluctuations affecting, for example, patterns of resource exploitation, population densities, technological innovations, social interactions, and so on (e.g. O'Connor et al 1993; Zilhão 2006:192-193). Different components of the "package" might be favoured to varying degrees at different times based on functional or adaptive considerations, and vice versa: altered environmental circumstances could alternatively favour the decline or disappearance of particular components. In this scenario, individual components may be expected to show a fluctuating or seemingly stochastic pattern, at least initially; the accumulation of the complete "package" of traits is likely to be an unsteady process and probably a relatively uncommon phenomenon.

Thermal/clothing elements?

The archaeological visibility of certain components of behavioural modernity may be related to the development of clothing for thermal reasons, in response to climatic fluctuations during the Pleistocene (Gilligan 2007b, 2010). Technological, economic and psychosocial aspects of clothing are involved, and physiological parameters provide a pragmatic basis for some of the observed associations with environmental changes. For example, changing patterns of site utilization and resource exploitation strategies may relate to thermal considerations, with particular technological innovations and trends relating specifically to the technological requirements for manufacturing adequate levels of portable thermal protection. Similarly, the acquisition and development of clothing for thermal reasons may affect the archaeological visibility of personal decoration, leading to changing manifestations of adornment (and other "symbolic" behaviour) in the archaeological record. For instance, thousands of beads evidently sewn onto complex garments accompany burials at the Russian site of Sungir, dating to between 26,000 and 19,000 years ago, during the LGM (Bader and Bader 2000:29; Kuzmin et al 2004). Before exploring the extent to which these possible relationships between clothing and behavioural modernity are borne out by environmental patterning in the various components of behavioural modernity in Australia and elsewhere, there are a number of basic concepts and propositions to be summarized.

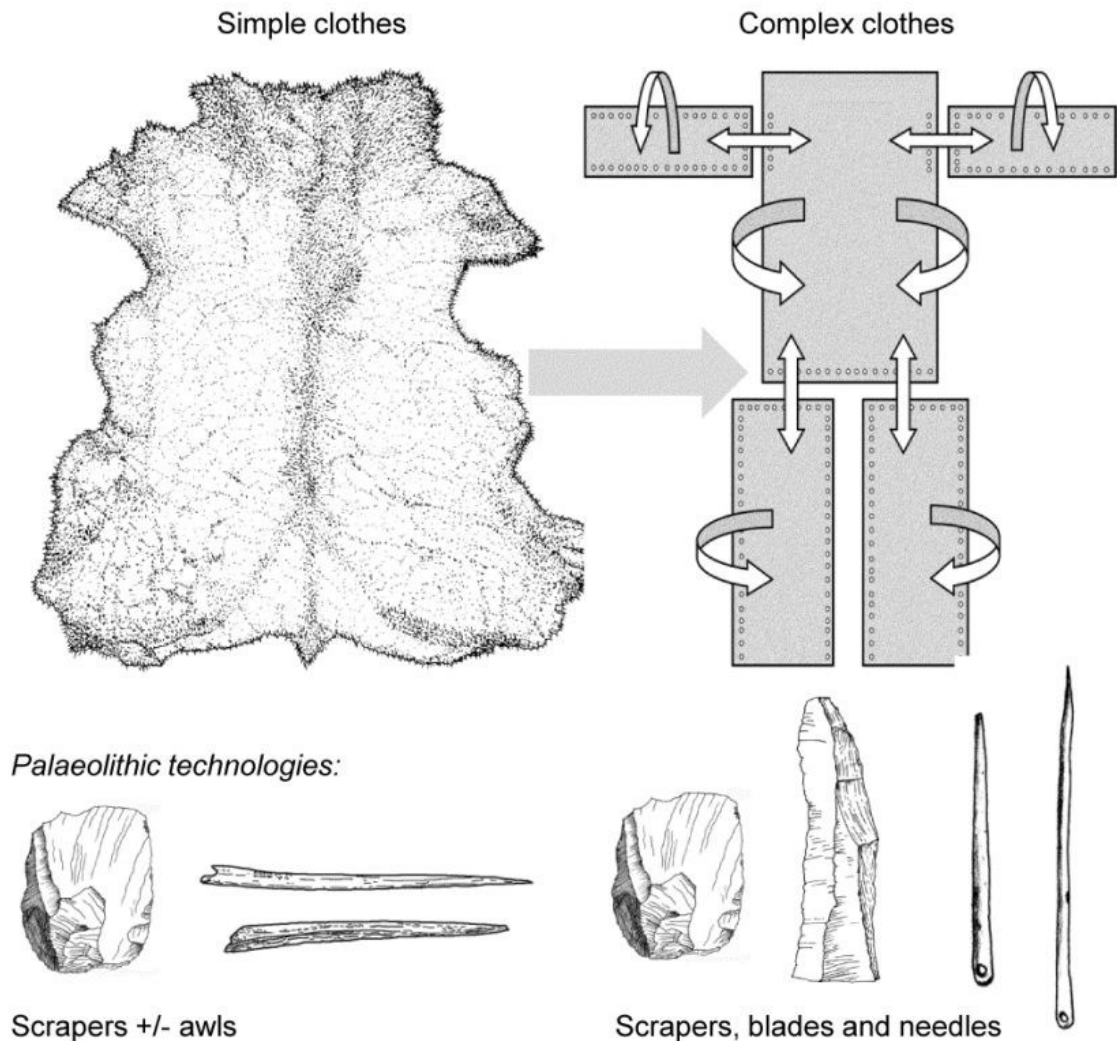


Figure 2. Simple and complex clothing and the associated Paleolithic technologies.

PLEISTOCENE CLOTHING

The Pleistocene ice ages presented significant adaptive challenges for hominins from a thermal perspective, given a thermoregulatory system geared to losing body heat in tropical climates (e.g. Aiello and Wheeler 2003; Hoffer 2005). Reduction of the typical mammalian fur cover and a heightened capacity for sweating are the most obvious biological adaptations to heat stress inherited by fully modern humans from our early African ancestors, with behavioural adaptations (the use of fire, shelter and clothing) being adopted by humans exposed to fluctuating levels of cold stress during the Middle and Upper Pleistocene. Of these behavioural cold adaptations, only clothing can provide the levels of portable insulation required for a sustained human occupation of cooler environmental zones beyond certain definable physiologi-

cal limits. While no actual remains of clothing survive in the archaeological record of the Pleistocene, various lines of evidence (palaeoclimatology, physiology, and a range of archaeological correlates of the manufacture of clothing) can be utilized to infer the presence or absence of clothing — as well as differing levels of thermally-effective clothing — in Pleistocene contexts (Gilligan 2010).

Clothing origins

One fundamental assumption of this approach is that prehistoric humans first adopted clothing for thermal reasons — as protection from cold — rather than for social or psychological reasons. The argument in favour of thermal origins is detailed elsewhere (Gilligan 2010:26-29); in essence, only a thermal model of clothing origins is consistent with all avail-

Property		Simple clothes	Complex clothes
Structure			
	fitted	no	yes
	number of layers	1	1+
Thermal physiology			
	wind chill protection	poor	excellent
	still-air protection (generally)	1-2 clo	2-5 clo
Technology (palaeolithic)			
	scraping implements	yes	yes
	piercing implements (generally)	no	yes
	cutting implements (generally)	no	yes
Repercussions			
	impairs cold tolerance	no	yes
	acquires decorative role	no	yes
	acquires social functions	no	yes
	promotes modesty/shame	no	yes
	becomes habitual	no	yes

Table 1. Features distinguishing simple and complex clothing.

able sources of evidence, which include physiology, palaeo-climatology, palaeoanthropology, prehistoric archaeology, ethnography and genetic studies of modern body lice that infest clothing. Clearly, the use of clothing by modern humans during the historical period has been governed by psychosocial as well as thermal influences, and this elaboration of clothing functions is associated with a crucial development in prehistoric clothing that is relevant to certain archaeological indicators of behavioural modernity.

Simple and complex clothing

On the basis of the thermal properties of clothing, a distinction can be drawn between “simple” and “complex” clothing (Gilligan 2007b:103-104 and 2010:24-26). The primary aspect of this distinction is whether garments are draped loosely over the body (“simple” clothing) or instead are properly shaped and fitted (or “tailored”) to enclose the limbs as well

as the torso (“complex” clothing). The latter offers greater thermal protection (especially from wind chill) and, during the Pleistocene when clothing materials comprised mainly (if not exclusively) animal skins rather than woven fabrics — evidence for the latter being extremely limited (e.g. Adovasio et al 1996; Soffer et al 2000) — the manufacture of complex clothing (which also facilitated the development of multi-layered garment assemblages) generally entailed additional technologies (Figure 2). Furthermore, the regular use of complex (as opposed to simple) clothing favoured the acquisition of psychological and social motivations for wearing clothes (Table 1), promoting the continuing use of clothing more-or-less independently of thermal requirements.

Archaeological correlates of clothing

Despite the invisibility of Pleistocene clothing, there nonetheless exist predictable correlates of clothing that are dis-

Discipline	Major lines of evidence
<i>Ethnography</i>	Cautious extrapolation (ethnographic analogy)
<i>Archaeology</i>	Technologies (e.g., scrapers, needles); rock art
<i>Physiology</i>	Limits to cold tolerance; clothing physiology
<i>Palaeoclimatology</i>	Pleistocene thermal conditions: temperature/wind proxies
<i>Molecular biology</i>	Dating of complex clothing origins (body lice)

Table 2. Sources of evidence relating to Pleistocene clothing.

cernable in the archaeological record (Table 2). Moreover, simple and complex clothing are associated not only with different thermal properties but also with differing archaeological signatures. With respect to palaeolithic technologies, both are associated with hide-scraping implements, but complex clothing has additional correlates in the form of hide-cutting and hide-piercing implements. The advent and proliferation of basic and additional technologies should occur at times and in regions corresponding to colder climatic conditions experienced by hominins. Furthermore, whereas the correlates of simple clothing may be expected to manifest a sporadic or fluctuating pattern over time (with the use of simple clothing being essentially utilitarian, determined by prevailing thermal conditions), the tendency for complex clothing to acquire psychosocial functions should result in a greater tendency for the complex “package” of correlates to coalesce and accumulate over time, beginning during periods of more severe and prolonged cold stress, and to ultimately become increasingly decoupled from thermal contingencies.

Elements of modern human behaviour

Among the components of modern human behaviour which may relate to thermal issues in the Pleistocene (Table 3), not all relate specifically to clothing. Of those that do not relate to clothing, the list includes expansion of human settlement into more extreme (colder) environments, evidence for the controlled use of fire, recurring occupation of sheltered (e.g. cave) sites, and intensification of resource exploitation strategies (e.g. targeted hunting of animal species to meet increased caloric requirements in colder environments, as well as providing the necessary raw materials for manufacturing clothing). Given the common (thermal) denominator, these components should tend to be associated with fluctuating climatic conditions and also with those components of behavioural modernity that may relate more specifically to the use of clothing. Among the latter may be mentioned scraping, cutting and piercing implements (e.g. standardized scrapers and blade tools, and bone awls or needles), depending on the differing thermal requirements for simple and complex cloth-

ing. The latter, however, has special significance for the “symbolic” elements of modern human behaviour. The regular use of complex clothing will favour a shift in decorative media, from decoration of the unclad body surface (largely invisible archaeologically) to external forms of decoration and adornment (e.g. beads and pendants), resulting in greater archaeological visibility of such “symbolic” behaviour in the archaeological record (e.g. Vanhaeren and d’Errico 2006).

GLOBAL TRENDS

Throughout the Lower and most of the Middle Pleistocene, the expansion of hominins out of the tropical and subtropical zones was restricted to the warmer interglacial periods (Gilligan 2010:36-39). The controlled use of fire dates from at least 800,000 years ago (Goren-Inbar et al 2004), and an increasing frequency of standardized scraper tools in lithic assemblages (facilitating the manufacture of simple clothing) accompanied greater hominin presence in middle latitudes during colder stadials towards the end of the Middle Pleistocene. In western Europe, the relative frequency of scrapers in assemblages correlates strongly with the colder phases of the Middle and Upper Pleistocene (Monnier 2006), while blade tool production in northern and southern Africa and the Near East waxed and waned throughout the Middle Pleistocene, beginning around 400,000 years ago at the end of a very warm interglacial (Bar-Yosef and Kuhn 1999; Gopher et al 2005). Early blade tools in Europe date from the penultimate ice age (e.g. Delagnes and Meignen 2006). In northeastern Asia, the use of complex clothing is indicated by both blade industries and eyed needles from around 30,000 years ago, leading into the LGM, and similar industries accompanied the first humans to enter the Americas from Siberia in the terminal Pleistocene (Turner 2002; Pavlov et al 2004; Hofecker 2005).

African origins

In Africa and the Near East, the early MSA and LSA industries (associated with standardized scraper and blade technologies and facilitating the manufacture of simple and complex

Strength	Archaeological signature of behavioral modernity
<i>Strong</i>	Range extension to previously unoccupied environments (cold)
	New lithic technologies (blades)
	Tools in novel materials (bone)
	Greater control of fire (e.g., stone-lined hearths)
	Site reoccupation and modification (greater use of sheltered sites)
	Specialised hunting (for meat and hides / furs)
	Personal adornment (beads and ornaments)
	Parietal art (and other external images and representations)
<i>Moderate</i>	Increased artefact diversity and standardization (functional variation)
	Geographic / temporal variation in formal tool categories
	Increased use of pigment

Table 3. Archaeological signatures of behavioural modernity grouped according to the strength of their suggested association with complex clothing and other thermal adaptations.

clothing, respectively) tend to occur in the cooler regions and during the colder phases of the late Pleistocene (Gilligan 2010:42-43). In other words, this component of modern human behaviour (production of standardized lithics) may, to some extent, reflect clothing-related technological issues associated with major environmental fluctuations (Figure 3). The earliest archaeological evidence for personal adornment comprises perforated shell beads in northern Africa and the Levant which date broadly to the early cold phases of the last ice age (Vanhaeren et al 2006; Bouzougar et al 2007). This early evidence for “symbolic” behaviour in the African MSA (occurring in the cooler southern as well as the northern parts of the continent) coincides with genetic evidence from studies of body lice that estimates the origin of complex clothing to the colder phases in the first half of the last ice age (Kittler et al 2003, 2004; Reed et al 2004; Light and Reed 2009). Southern Africa also yields early bone awls for piercing hides, dating to the cold phases — Marine Isotope Stages (MIS) 5a/b and 4 — between 84,000 and 72,000 years ago (d’Errico and Henshilwood 2007). An early southern African blade tool industry (Howiesons Poort) dates to the very cold period around 75,000 years ago, but thereafter this blade industry disappears with climatic warming early in MIS 3; blade tools, along with items of adornment and eyed needles,

subsequently typify the LSA that became more widely established in Africa during the colder climatic swings in late MIS 3 and during MIS 2 (the LGM).

Eurasian intensification

While many components of behavioural modernity are seen to appear (and, at times, disappear) in Africa and the Near East during the Middle and Upper Pleistocene, mid-latitude Eurasia witnessed a dramatic proliferation and coalescence of most elements during the coldest stages of the last ice age (Figure 4). These include intensive resource exploitation (specialised hunting of hide-bearing animal species), sustained settlement in colder environments, greater control of fire, long-term reoccupation of sites (notably sheltered cave sites), new tool forms and greater artefact diversity and standardization (notably scraper and blade-based technocomplexes, and bone awls and needles) and last but not least, a fluorescence of art and other signs of symbolic behaviour. These developments coincide closely with climatic fluctuations and intensified physiological requirements for clothing — many can be linked quite directly (via use-wear studies and improved resolution of palaeoclimatic reconstructions, for instance) to thermally-based developments in clothing (Gilligan 2010:41-47), for which there exists ample direct

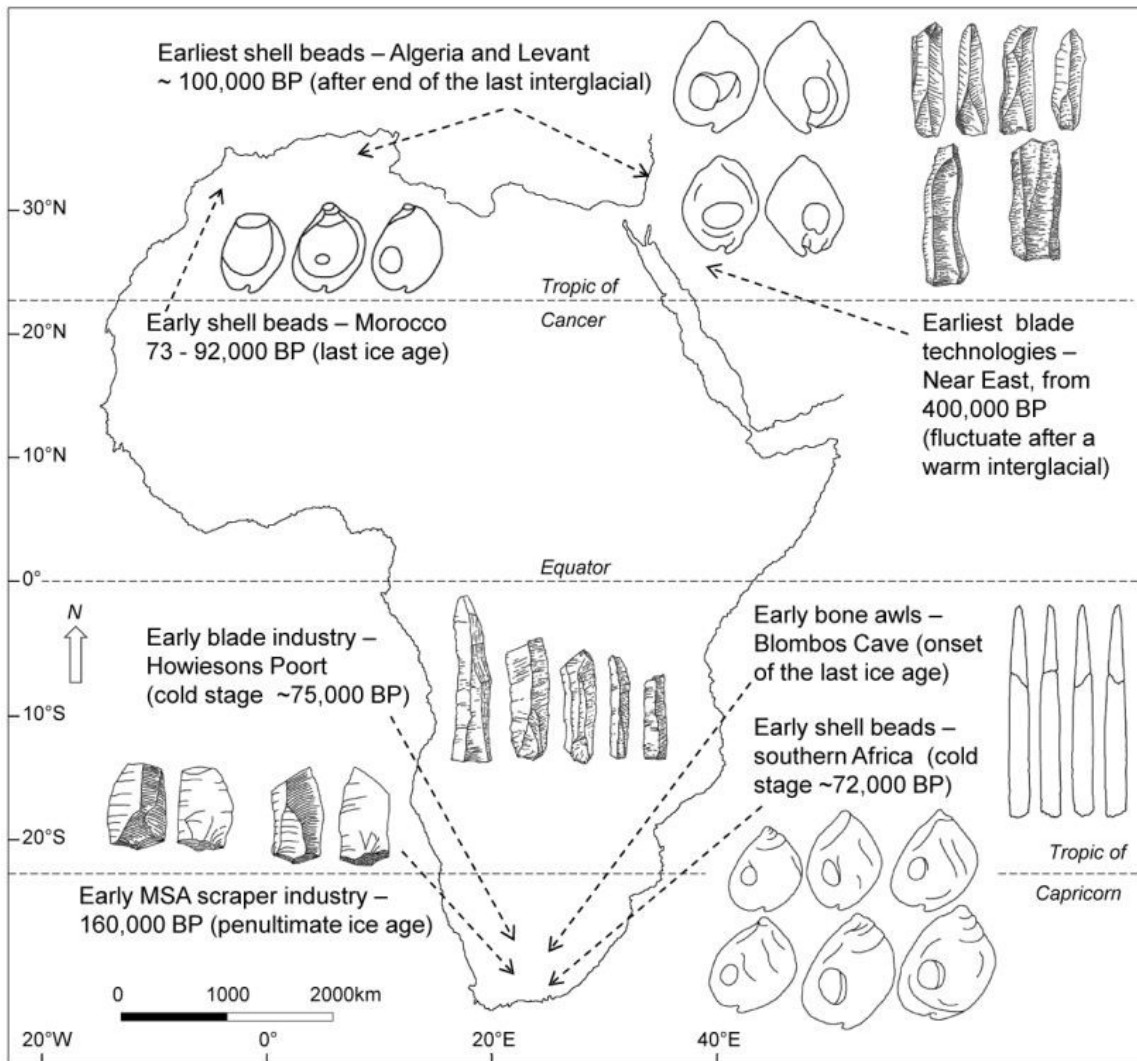


Figure 3. Early African signs of behavioural modernity and environmental trends.

and indirect evidence in the archaeological record (e.g. figurines depicting clothed humans). The regular use of complex clothing (confirmed by the production of eyed needles in upper palaeolithic assemblages) becomes widely established across mid-latitude Eurasia during the LGM, accompanied by a “creative explosion” (Pfeiffer 1982; Renfrew 2009) in durable, archaeologically-visible signs of decoration, adornment and other forms of artistic expression. In contrast to the fluctuating visibility of various components of behavioural modernity documented elsewhere in the Pleistocene, most of these Eurasian developments and their repercussions (including derivative technologies) are sustained — and even elaborated — across the Pleistocene-Holocene boundary, concomitant with a decoupling of complex clothing from thermal contingencies as acquired psychosocial functions increasingly rendered clothing socially indispensable.

Neanderthals and the Châtelperronian

The potential value of considering clothing-related thermal issues and the environmental context of archaeological signals of behavioural modernity is illustrated by the Châtelperronian industry produced by Neanderthals during a series of abrupt, extreme climatic fluctuations prior to the LGM. Once dismissed as an outcome of acculturation by contacts with immigrant fully modern humans, the Châtelperronian is more likely an indigenous phenomenon among Neanderthals who began to develop complex clothing (Gilligan 2007c:507-508). A suite of archaeological markers of modern behaviour (e.g. new technologies in the form of blade tools and bone awls, and archaeologically-visible “symbolic” behaviour in the form of decorative beads) emerged among these hominins whose enhanced biological cold tolerance had hitherto allowed them to survive in ice age

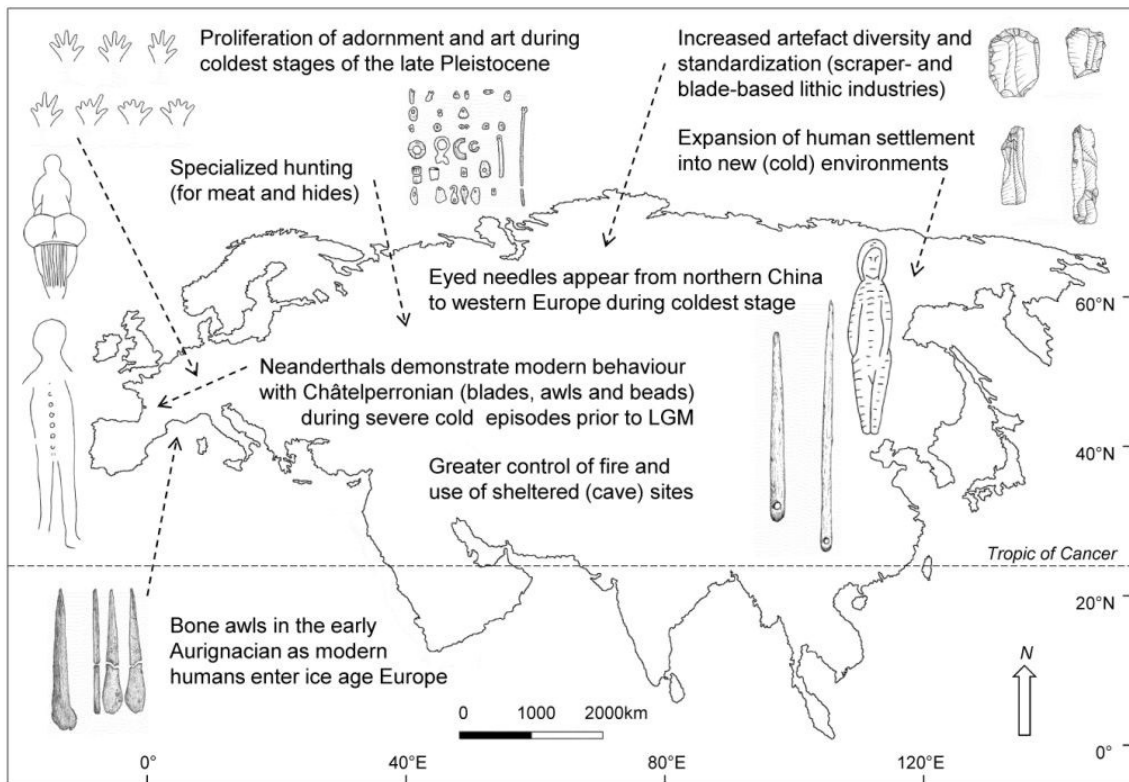


Figure 4. Late Pleistocene intensification of archaeological signs of behavioural modernity in western Eurasia.

Europe with simple clothing (and with toolkits dominated by standardized scrapers). That Neanderthals should manifest a heightened propensity for signs of behavioural modernity in environmental circumstances demanding heightened thermal protection is hardly coincidental and in itself might explain the otherwise seemingly “impossible” coincidence (Mellars 2005) between the advent of the Châtelperronian and the arrival of fully modern humans with similar archaeological traits in Europe — although the Neanderthals’ retreat to warmer southern refugia and ultimate demise during severe wind chill stresses accompanying climatic upheavals in late MIS 3 (Stringer et al 2003) suggests that their clothing innovations proved “too little, too late” (Gilligan 2007c:507).

THE AUSTRALIAN CHALLENGE

The shift from a Eurocentric to an Afrocentric view of behavioural modernity (McBrearty and Brooks 2000) may have been long overdue, but the more recent critiques highlighting the challenges posed by the Australian archaeological record suggest that an Australocentric perspective may have far-reaching implications for the whole concept of behavioural modernity. To what extent, then, does the Australian record lend support to the proposed links between the development

of clothing and some of the key archaeological markers of behavioural modernity?

Clothing in Aboriginal Australia

The most important observation about the use of clothing in Australia prior to the colonial era is that, judging from the ethnographic evidence, it was largely absent. Indeed, this may have been the case from the outset: the ancestors of the first humans who reached Australia by 45,000 years ago had probably travelled from Africa without needing to venture beyond the tropics (Bulbeck 2007), and without needing clothes for protection from cold. Even in cooler regions of the continent where some clothing was manufactured, its use was not habitual. Thus, a complete absence of any form of clothing was not uncommon throughout most of the year, even in Tasmania (Gilligan 2007d, 2008). There is no compelling evidence that clothing served any psychosocial functions, except in parts of northern coastal Australia where the occasional use of girdles and skirts among young females was probably a result of external cultural influences, (e.g. from New Guinea [Gilligan 2007d:492-493]). No complex clothing is documented anywhere in Aboriginal Australia: the typical indigenous apparel (kangaroo and wallaby skin capes, and sewn possum-fur cloaks) comprised loosely-draped gar-

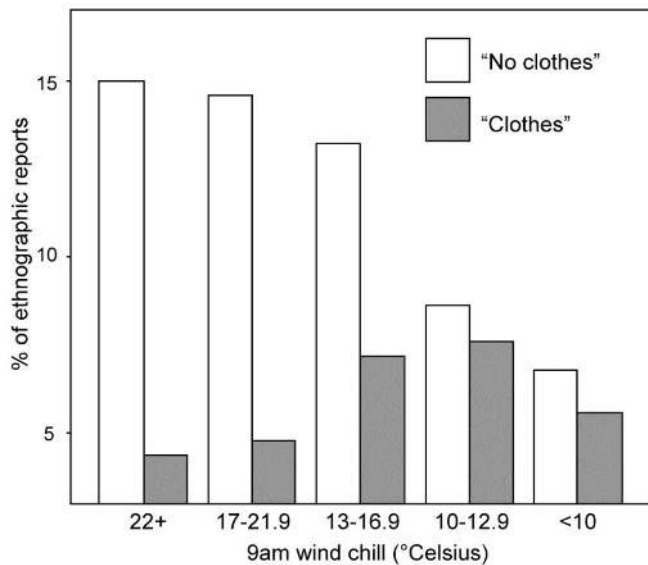


Figure 5. Climatic patterning of clothing use in Aboriginal Australia.

ments, i.e. simple clothing. A continent-wide analysis of ethnohistorical accounts of clothing in relation to local meteorological indices (e.g. Figure 5) is consistent with the case for simple clothing serving thermal functions (Gilligan 2007d:491). The psychosocial functions of personal adornment and social display were served primarily by decoration of the unclad body surface, mainly body painting and skin scarification, for which archaeological signatures are relatively weak — the use of ochre dating from around 40,000 years ago provides the best evidence, and small tools used ethnographically for decorative scarification (cicatrices) are also occasionally recovered in the archaeological record (e.g. McNiven 2006:7-8).

Weak archaeological signatures

The general paucity of clothing in Aboriginal Australia is matched by a comparable paucity of archaeological markers of behavioural modernity, and a total absence of complex clothing is reflected in the limited archaeological visibility of adornment. The use of ochre, as mentioned above, is present from the outset and consistent with body painting, in the typical absence of clothing. However, other components of behavioural modernity (or archaeologically-visible “symbolic” behaviour) which may relate to the production of clothing (e.g. standardized scraper and blade-based lithic technologies, and specialized hunting of hide-bearing animal species) are, with the notable exception of Tasmania, largely conspicuous by their absence throughout the late Pleistocene and early Holocene. Hide-piercing bone tools do appear in cooler southern regions during the late Pleistocene, in association with stone scrapers, at sites like Devil’s Lair (Dortch 1984:50

-64), Cloggs Cave (Flood 1973, 1980:269-272), and in Tasmania, but it is not until the mid-late Holocene that other evidence of behavioural modernity becomes more widespread. This is particularly true in southeastern Australia where, coincidentally, the use of clothing was more commonplace than elsewhere on the continent.

TASMANIAN EVIDENCE

Unlike mainland Australia, Tasmania appears to have remained isolated from external cultural influences since the terminal Pleistocene, as illustrated by the failure of the dingo — introduced from Southeast Asia, probably around 5,000 years ago (Savolainen et al 2004) — to reach the island. The Tasmanian archaeological record also lacks the mid-late Holocene developments that constitute the majority of evidence for behavioural modernity in Australia. Perhaps this might be explained — or explained away — by lower population densities on the island, though such an accommodative argument would be difficult to substantiate. The Tasmanian record does, however, provide compelling evidence for signatures of behavioural modernity — collectively, the strongest evidence in the whole of Sahul — during the late Pleistocene, when greater use of clothing was required for human survival in the region during the LGM (Gilligan 2007a, 2007b).

Late Pleistocene developments

The late Pleistocene occupation of numerous cave and rock shelter sites in the remote southwestern highlands of Tasmania constitutes, in itself, one “diagnostic” attribute of behavioural modernity, namely an expansion of human settlement into a new (colder) environmental zone. Collectively, these sites document a recurring human presence throughout the LGM, with the preservation of emu egg shell at one site (Nunamira Cave) showing that humans were present during late winter or early spring, “the most stressful season for hunter-gatherers” (Cosgrove 1995a:76-77). Analyses of dental growth patterns (odontochronology) in wallaby remains from sites at different altitudes show a seasonal pattern in relation to altitude: valley sites at lower altitudes (<250m a.s.l.) were utilized more intensively during winters, while upland sites at higher altitudes (>400m a.s.l.) — where winter conditions are colder due to altitude — were occupied exclusively during the warmer months, from early spring through to late summer (Pike-Tay et al 2008:2540). Overall, the natural protection from wind chill afforded by these sheltered sites may provide the main reason for an otherwise unexpected settlement pattern where humans gravitated to a remote region at higher latitude (and generally higher altitude) during the LGM (Gilligan 2007a), a settlement pattern made more surprising considering that both the ethnographic and archaeological record indicate an absence of Aboriginal activity in this comparatively rugged southwest corner of the island during the Holocene. Other notable Tasmanian devel-

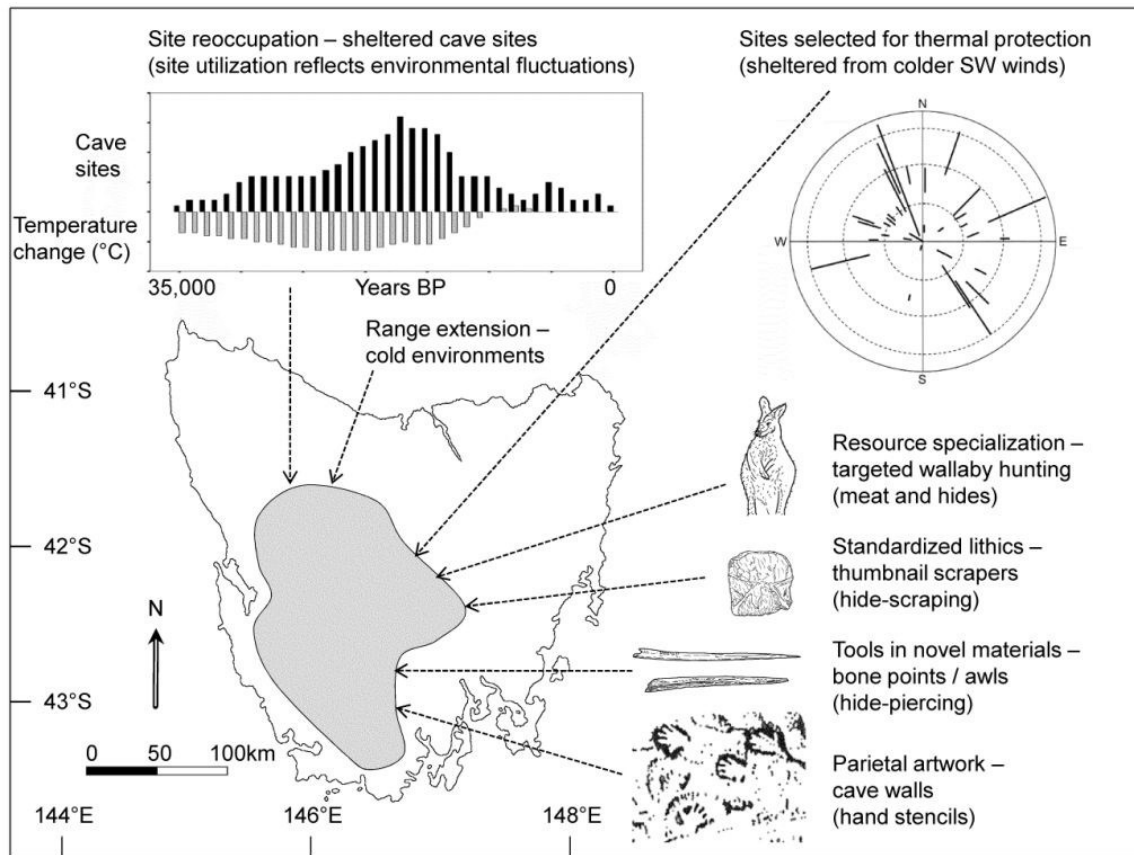


Figure 6. Late Pleistocene developments in Tasmania.

opments (Figure 6) include faunal evidence for the targeted hunting of the dominant local fur-bearing species, the red-necked (or Bennett's) wallaby — with the frequency distributions of body-part remains suggesting deliberate separation of the skins for making clothes (Cosgrove and Allen 2001:413-418; Cosgrove 2004:60) — along with control of fire (hearths) and the production of standardized lithics (thumbnail scrapers) together with new tool forms (bone points).

Modern human behaviour in Tasmania?

These late Tasmanian developments provide unambiguous evidence for the early appearance of a constellation of archaeological markers of behavioural modernity in this most southerly part of Sahul, coincident with significant climatic fluctuations and thermal stresses for the human population in the region. Of special significance here is the fact that all these indicators of behavioural modernity can be seen as adaptive responses to thermal challenges to human survival, with the majority — resource intensification, standardized lithics and bone tools — being interpretable as archaeological correlates of the manufacture of clothing (Gilligan 2007b:107-108). Use-wear studies of these Tasmanian artefacts confirm

hide-working as one of the likely functions performed by both thumbnail scrapers (Fullagar 1986:348-350) and bone points (Webb and Allen 1990:77-78). Palaeoenvironmental reconstruction (Gilligan 2007a:562) shows estimated LGM wind chill levels that required simple rather than complex clothing for adequate physiological protection from cold, so an absence of blade tool technology — otherwise somewhat mystifying, given the obvious parallels with trends in late Pleistocene Europe (Cosgrove and Allen 2001:399) — is consistent with this thermal scenario. Similarly, an absence of archaeological signs of adornment in late Pleistocene Tasmania is consistent with the use of simple rather than complex clothing. Interestingly, the presence of bone awls for piercing animal skins — more typical of complex clothing — is attributable to the small size of the skins from the largest available fur-bearing animal species in the region, with a number of wallaby skins needing to be sewn together to make a substantial draped cloak (Gilligan 2007b:109).

The Holocene reversal

Another prominent feature of the Tasmanian archaeological record is explicable in terms of clothing-related thermal contingencies: all these signs of behavioural modernity that be-

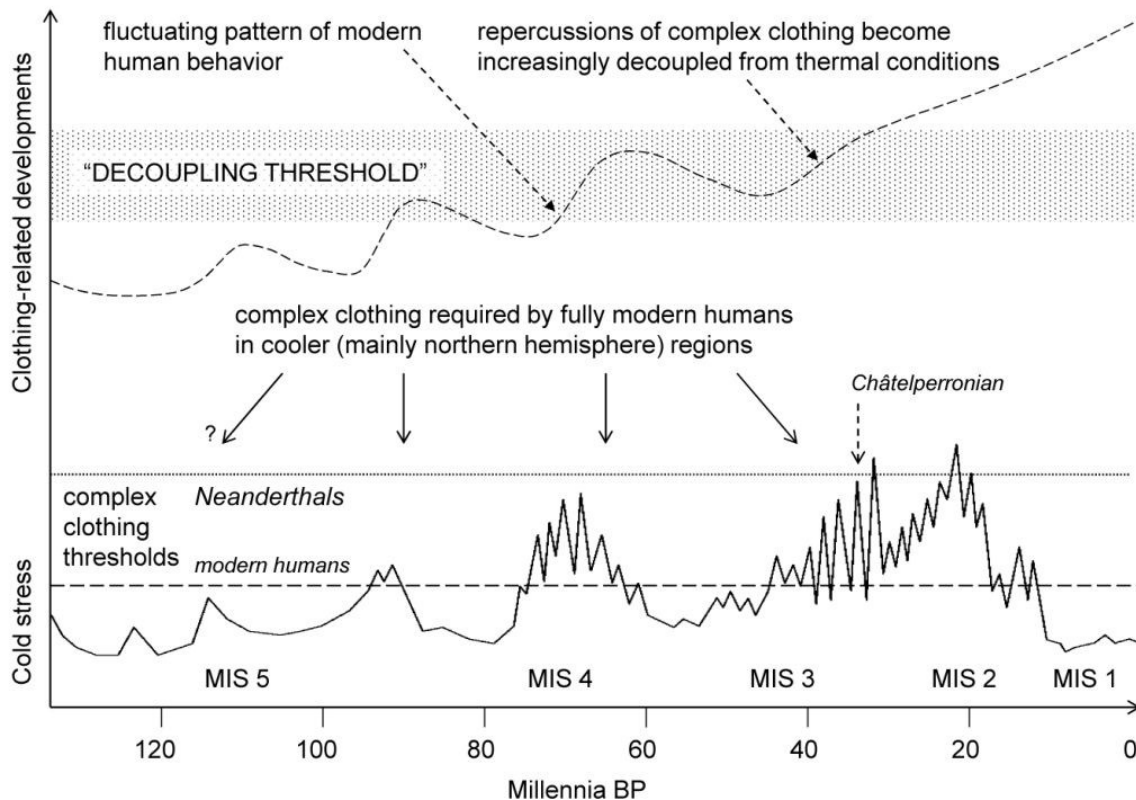


Figure 7. Generalised thermal trends and clothing requirements during the last glacial cycle, with decoupling of complex clothing from thermal conditions.

came established in the late Pleistocene are reversed during the early-mid Holocene. While limited human occupation continued into the Holocene at a few cave sites elsewhere in the Tasmanian region (e.g. Cosgrove 1995b:100), the southwest cave sites are abandoned and, throughout Tasmania, both the resource and the technological specializations essentially disappear from the archaeological record. These late Pleistocene Tasmanian developments show some remarkable parallels to those that occurred independently in middle latitudes of the northern hemisphere (and also in cooler regions of Africa) during the Middle and Upper Pleistocene. And yet, their partial development during the late Pleistocene and rapid reversal in the Holocene stands in marked contrast to the greater intensification of developments during the LGM in Eurasia (where climatic conditions were more severe), as well as their subsequent persistence (and, in some respects, further elaboration) across the Pleistocene-Holocene boundary.

Both the parallels and contrasts between late Pleistocene Tasmania and comparable trends in Africa and Eurasia may be largely explicable in terms of the suggested cultural implications of the distinction between “simple” and “complex” clothing. In the former case, the use of simple clothing will

fluctuate in concert with environmental changes, whereas with complex clothing there is a greater tendency for its use to become sustained by non-thermal — e.g. psychosocial — considerations (Figure 7), leading to the potential for its archaeological correlates to become more-or-less decoupled from prevailing climatic conditions (Gilligan 2007b:109). The thermal need for clothing in late Pleistocene Tasmania, however, was limited to simple (draped, not fitted) garments, and hence the corresponding archaeological markers of behavioural modernity remained coupled closely to environmental fluctuations (Figure 8) — as was generally the case in Africa and Eurasia prior to the Upper Pleistocene.

CONCLUSIONS

Environmental patterning in some of the key archaeological markers of behavioural modernity is evident not only in Australia but also in Africa and Eurasia, especially during the late Pleistocene. Thermal considerations in general, and clothing-related contingencies in particular, provide a plausible basis for linking the early, fluctuating occurrence of certain elements of behavioural modernity — such as specialized resource exploitation strategies, standardized and novel technologies, and archaeologically-visible signs of adornment

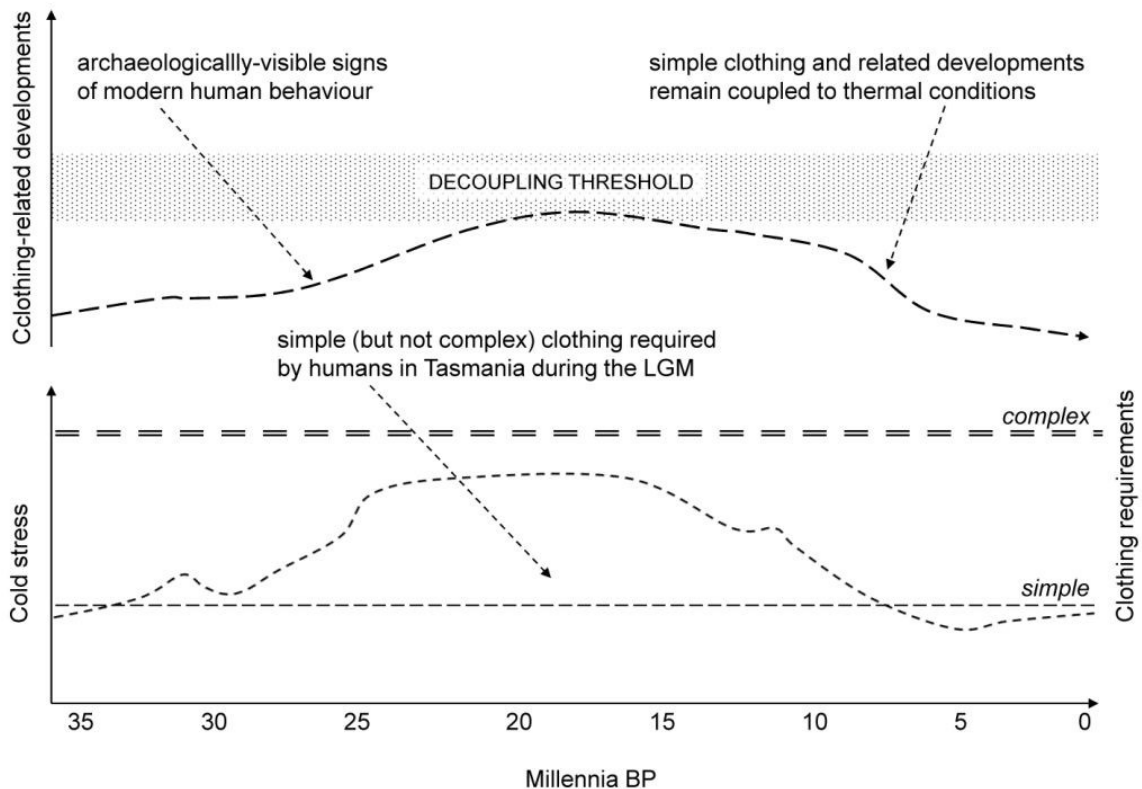


Figure 8. Thermal trends and clothing requirements in late Pleistocene and Holocene Tasmania.

and social display — to fluctuating climatic conditions. Implicit in this approach is the assertion that a capacity for behavioural modernity was present among fully modern humans (and quite possibly other hominins) from Middle Pleistocene times (cf. Klein 2000), and accompanied the arrival of humans in Australia.

Australia: limited clothing, little modernity

Recent reviews of the Australian archaeological record demonstrate clearly that no “package” of archaeological traits can be used to infer the presence of behavioural modernity. Rather, the varying frequencies of individual elements — shown in some instances to coincide with large-scale environmental changes — suggest that adaptive and other pragmatic influences may have played a significant role in the emergence and, at times, proliferation, of archaeological signs of behavioural modernity. The prehistoric development of clothing for thermal reasons offers one perspective for exploring the possible adaptive aspects of the observed environmental patterning. In Aboriginal Australia, the limited (and exclusively thermal) use of clothing may, at least in part, explain a comparative paucity of many elements of the “package” of behavioural modernity in the archaeological record.

Tasmania: unusual case, or good example?

It is the archaeological record of Tasmania, however, that yields the most compelling case for a causal relationship between thermal repercussions of climate change and the archaeological patterning of behavioural modernity. In particular, the late Pleistocene developments in Tasmania (and their reversal in the Holocene) illustrate the likely influence of clothing-related issues in the varying archaeological visibility of some key elements of behavioural modernity. The parallels (and contrasts) between Tasmania and ice age Europe are indeed striking, with divergent trends in the Holocene largely attributable to the differing archaeological signatures (and psychosocial repercussions) of simple and complex clothing.

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