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THE HOWIESONS POORT OF SOUTH AFRICA: WHAT WE KNOW, WHAT WE THINK WE KNOW, WHAT WE NEED TO KNOW

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The Howiesons Poort of South Africa: what we know, what we think we know, what we need to know

by

Marlize Lombard

Natal Museum, P. Bag 9070, Pietermaritzburg, 3200 South Africa & School of Human and Social Studies, University of KwaZulu-Natal, P. Bag X01, Scottsville, 3209 South Africa; mlombard@nmsa.org.za

ABSTRACT

This contribution aims to provide a concise review of Howiesons Poort research conducted over the past eight decades since the industry was first identified. A review is considered useful in the light of current interest in the industry and what it means in terms of technological and cognitive evolution. It is also true that far-reaching behavioural hypotheses have been built around the Howiesons Poort, some with very little supporting evidence. Recent developments in stone tool analysis, environmental reconstruction and dating methodology are providing us with new tools to measure the time depth and limits of the Howiesons Poort. Such methods may also provide detailed empirical data to build onto or re-assess hypotheses regarding human behaviour associated with this stone tool industry.

INTRODUCTION

This contribution provides a review of the literature relating to the Howiesons Poort stone tool industry in South Africa. I summarise the main topics previously published concerning distribution in time and space and the major characteristics associated with the industry. Behavioural hypotheses based on the Howiesons Poort, and their published counter arguments, are presented. Although I comment on some arguments—for example the shamanistic/spiritual interpretation of Lewis-Williams and Pearce (2004)—it is not the purpose of this paper to engage in focussed discourse or to provide extensive critique regarding any one of the presented hypotheses. The aim is to highlight all the issues in a single document, create awareness that some of these hypotheses are untested, and suggest possible future research areas.

The term 'Howiesons Poort' (HP) was first used in 1927 to describe a stone artefact assemblage excavated from a small rock shelter in the eastern Cape by Stapleton and Hewitt (1927, 1928). They gave the main characteristics of what they termed the 'HP Series' as the presence of burins, large segments, obliquely pointed blades, and trimmed points. Similarities to both Later Stone Age (LSA) microlithic industries and the European Upper Palaeolithic led to the industry's previous classification as a variety of the Magosian, as described by Clark (1954), and as a transition between the Middle Stone Age (MSA) and the LSA (Clark 1959; Hole 1959; Vishnyatsky 1994). However, excavations at Peers Cave in the 1940s already hinted that the HP was a sub-stage of the MSA (Jolly 1947, 1948) rather than intermediary to the LSA.

The idea of the HP being transitional was considered laid to rest when excavations in 1967–8 by Singer and Wymer (1982) exposed one of the key reference sequences for the southern African MSA at the Klasies River Main Site (Thackeray, A. 1992). Subsequently the MSA sequence at this site was subdivided into five chronological divisions: MSA I, MSA II, HP, MSA III and MSA IV. The HP stage at Klasies River

was characterised by distinctive backed pieces such as trapezes and segments (also referred to as crescents or lunates) reminiscent of, but generally larger than, those associated with LSA industries (Thackeray, A. 2000). This sequence showed that material similar to that from the HP name site was both preceded and succeeded stratigraphically by other MSA industries. However, the notion that the industry was transitional between the MSA and LSA or, at most, a final expression of the MSA persisted until fairly recently. Parkington (1990) suggested that at least some such assemblages might date to the end rather than the middle of the MSA (between 50 000 and 35 000 years ago).

SITES, DATES AND CHARACTERISTICS ASSOCIATED WITH THE HOWIESONS POORT

The sites

The HP is found primarily south of the Limpopo River (Fig. 1). Besides Klasies River, Boomplaas Cave contains HP material below a MSA assemblage dated to *c.* 32 000 BP (Deacon 1979, 1989; Deacon *et al.* 1984). At the Apollo 11 Cave, assemblages attributed to the HP are sandwiched between other MSA material (Freundlich *et al.* 1980; Wendt 1972, 1976). Border Cave has HP (Epi-Pietersburg) occurring stratigraphically between MSA

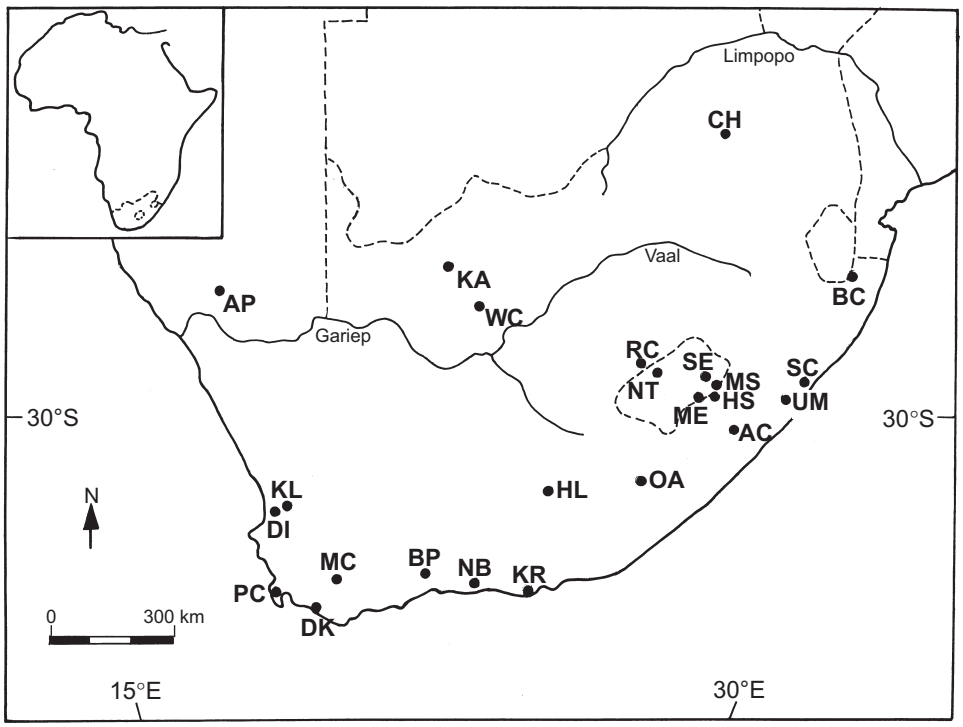

Fig. 1. Locations of sites mentioned in the text. KR - Klasies River; BP - Boomplaas; AP - Apollo 11; BC - Border Cave; SE - Sehonghong; MS - Moshebi's Shelter; ME - Melikane; HS - Ha Soloja; RC - Rose Cottage Cave; UM - Umhlatuzana; MC - Montagu Cave; PC - Peers Cave; SC - Sibudu Cave; NB - Nelson Bay Cave; KL - Klipfonteinrand; CH - Cave of Hearths; KA - Kathu; DI - Diepkloof; OA - Oakleigh; HL - Highlands Shelter; DK - Die Kelders; NT - Ntloana Tsoana; WC - Wonderwerk Cave; AC - Alfred County Cave.

Pietersburg and post-HP assemblages (Beaumont 1978; Beaumont *et al.* 1978). The eastern Lesotho sites of Sehonghong, Moshebi's Shelter, Melikane, and Ha Soloja are considered to have sequences of HP or HP-like assemblages succeeded by MSA deposits, although individual sequences are difficult to establish at these sites (Carter 1969, 1976, 1977; Carter *et al.* 1988; Volman 1984). Rose Cottage Cave, once thought to contain HP/Magosian/Modderpoort MSA material (Malan 1952; Kohary 1988) or HP followed by late MSA material (Butzer 1984), is now considered to have both pre- and post-HP MSA assemblages (Wadley 1991; Wadley & Harper 1989; Wadley & Vogel 1991). Kaplan (1989*a*, *b*, 1990) identified pre-HP, HP, Late MSA, and MSA/LSA transition assemblages at Umhlatuzana. At Montagu Cave Keller (1973*a*) attributed the entire contents of layer 2 to the HP. Volman (1981) disputed this interpretation, but a re-analysis of the material by Parkington and Poggenpoel (Parkington 1990) supports the Keller version. Peers Cave may have pre- and post- HP MSA, but a reliable stratigraphic sequence cannot be established from the excavation reports (Goodwin 1929, 1946; Jolly 1947; Peers & Goodwin 1953; Volman 1981). Excavations at Sibudu Cave in late 2002 also yielded a HP assemblage below a deep MSA deposit (Wadley & Jacobs 2004). Subsequent excavations at the site exposed the base of this phase, with a pre-HP component directly below. Although lithic analyses have not been completed, Sibudu Cave can now be added to the list of sites with pre- and post-HP MSA assemblages.

Multi-component MSA sites where the HP represents the most recent MSA material include Nelson Bay Cave (Deacon 1979*a*; Inskeep 1965, 1972; Klein 1972), Klipfonteinrand (Volman 1981, 1984), possibly the Cave of Hearths (Mason 1957, 1962, 1971), and Kathu (Beaumont 1990; Butzer 1984). Besides the name site, the HP is the only component represented at several other sites. These include Diepkloof in the western Cape—although excavations by Yates have identified apparent non-HP MSA material whose stratigraphic relationship to the HP at the site is not yet clear (Thackeray, A. 1992); Oakleigh Farm QOB (Derricourt 1977), and Highlands Shelter. At the latter site Hilary Deacon (1976) and Janette Deacon (1979*b*) identified an assemblage of HP type, but Volman (1981, 1984) assigned this to a post-HP stage.

The possibility that the HP may be present between other MSA material at Die Kelders was under investigation (Grine *et al.* 1991), but Anne Thackeray (2000) subsequently found that the 70 000 to 60 000 year old assemblages contain only informally retouched pieces, rather than HP type backed artefacts. Ntloana Tsoana is another site in Lesotho where the HP may be present (Mitchell & Steinberg 1992). According to Beaumont (2004), a disturbed area at Wonderwerk Cave produced a modest lithic assemblage that includes refined blades with a few unifacial points and possibly associated segments. However, it remains to be established whether the unit relates to the HP. The HP may also be present at a site known as the Alfred County Cave, excavated at the beginning of the twentieth century by William Bazley. Though long recognised as a site of importance, this shelter could not be relocated. However, Mitchell (1998) located at the British Museum some 200 stone tools from the site, including four segments described as HP-like. But, these may not necessarily be representative of the HP at this site (Wadley in press).

Dating

Up to the mid-1970s the HP was placed chronologically between the MSA and LSA of southern Africa. In the 1980s the HP was given a suggested age dating to Oxygen

Isotope Stage (OIS) 5b, with some sequences perhaps lasting until the beginning of OIS 4 (Volman 1984). This translated to between *c*. 80 000 to 60 000 years ago (Deacon 1989). The most plausible scenario seemed the linking of the HP with the end of the Last Interglacial and/or the beginning of the Last Glacial, suggesting a date of about 70 000 years ago or more (Deacon 1989; Deacon & Geleijnse 1988; Klein 1989). Parkington (1990) analysed in depth this 'consensus view' for the age of the HP. In his argument for younger HP dates at some sites, he mentions that a radiocarbon date at Diepkloof of 29 400 ± 675 BP (Pta-1051) (Parkington & Poggenpoel 1987) has been complemented by new dates of 40 800 ± 1400 BP (Pta-4489) and 42 400 ± 1600 BP (Pta-4488), both of the latter apparently being finite but considered minimal by Vogel (letter of 12.5.87 cited in Parkington 1990). Parkington (1990) warned against the temptation to reject the younger dates as contaminated and to use a stratigraphically lower date of > 45 270 BP (Pta-1054) as evidence that the entire HP at Diepkloof is much older. This argument became superfluous when new thermoluminescence (TL) dates for Diepkloof became available, indicating that the HP at the site occurs between 74 000 and 60 000 years ago (Parkington 1999).

At the Klasies River Main Site a date of about 70 000 years ago was initially suggested based on the view that the HP occurred within a period between 80 000 and 60 000 years ago of regressing sea levels and cooler drier climate (Deacon 1989; Thackeray 1989). Subsequently, thorium-uranium (Th-U) analyses of limestone formations at Klasies River and Boomplaas caves have been used to place the HP between *c*. 70 000 and 60 000 years ago (Vogel 2001). In a re-examination of the Th-U results, focussing on the standard deviations and variability around mean values for particular dates, rather than mean values alone, Francis Thackeray (2002) argues for the possibility that the industry relates to a younger period. He suggests an age of between 58 000 and 48 000 years ago, based on analysis of mammalian microfauna, marine molluscs, and oxygen isotope ratios (Thackeray, J.F. 1992, 2002). Using luminescence techniques on HP sediment samples, Feathers (2002) proposed the interval of 55 000 to 60 000 years ago as the most likely one for the HP. More recently, a weighted age of 56 000 ± 3 000 years ago was obtained by TL on 13 burnt quartzite specimens from the same layers (Tribolo 2003, cited in Valladas *et al.* 2005). So, at Klasies River, the site most extensively dated, there is good agreement between the results of independent dating methods applied to different samples (Valladas *et al.* 2005).

Various dating methods were also applied at Border Cave. Early dates (Butzer *et al.* 1978) based on the climatic sequence reflected in the sediments placed the HP levels between 80 000 and 95 000 years ago. However, the Border Cave electron spin resonance (ESR) dates (including those of 45 000–75 000 for the HP) are considered too young by ~30% compared with amino-acid racemization dates on ostrich eggshell (Grün *et al.* 1990; Grün & Stringer 1991; Miller *et al*. 1992; Miller *et al*. 1999). Attempts to resolve this discrepancy through TL and optically stimulated luminescence (OSL) dating were unsuccessful, owing to the powdery nature of the Border Cave sediments (Wintle 1996). In their revised ESR chronology for Border Cave, Grün and Beaumont (2001) arrived at dates between about 79 000 and 60 000 (OIS 4) years ago for the HP.

Preliminary luminescence dates from several of the HP layers at Rose Cottage Cave suggested that the industry there lasted from about 68 000 to 60 000 years ago (Gibson *et al*. 2004). The most recent TL results obtained from dating burnt lithic specimens

from the upper part of the HP at the site has three accepted ages which are in agreement and range from 56 300 ± 4 500 to 60 400 ± 4 600 years ago. This final HP techno-complex was probably deposited at the end of OIS 4 or the beginning of OIS 3. The results suggest that the transition from the upper HP layer to the post-HP was rapid and that it most likely occurred during OIS 3. It is interesting to note that the HP layers of Rose Cottage Cave occur in the same time interval represented by Klasies River (Valladas *et al*. 2005). Preliminary OSL dates from Sibudu Cave suggest an age of about 61 000 years for the upper HP layers (Z. Jacobs pers. comm.).

At present, dating by methods other than radiocarbon, on samples from Border Cave, Klasies River and Diepkloof, points to the placement of HP assemblages firmly within the period of 70 000 to 60 000 years ago. Younger radiocarbon dates almost certainly reflect contamination (Deacon, J. 1979*a*, 1995; Mitchell 2002). Recent radiometric data support this consensus, indicating that the HP techno-complex appeared about 70 000 years ago and that it was still in use at 54 000 to 62 000 years ago (Valladas *et al*. 2005).

The typology and technology

At Klasies River the HP assemblages are characterised by various backed and/or truncated forms such as trapezes and relatively large segments about 25 to 60 mm long. The industry also contains typical MSA blades (also called flake-blades), but these are often smaller than those in the other MSA divisions. Facetted platforms occur less frequently in the HP units. Retouch in the HP tends to occur on the proximal, medial and distal blade sections rather than on blades with the distal end missing, as in the rest of the sequence (Thackeray 1989). Even given the different traditions in artefact production through the sequence (MSA I, II, HP, MSA III, IV), the typological study with limited technological variables (Thackeray 1989) shows uniformity in the MSA at Klasies River. In Harper's (1997) opinion, the distinctive formal tool packages of the HP at Rose Cottage Cave do not represent a complete technological break with the earlier MSA industry. On the other hand, the Rose Cottage Cave HP sample is perceived to be different from samples at other sites. It has, for example, few segments or trapezes in contrast to Border Cave, Klasies River and Nelson Bay Cave (Beaumont 1978; Singer & Wymer 1982; Volman 1981). Although Rose Cottage Cave seems to be the only site dominated by backed blades and obliquely backed blades, Klasies River has many backed blades, and they are also common in Nelson Bay Cave and the HP name site (Deacon, J. 1995). At Rose Cottage Cave, Sibudu Cave and Klasies River, points are rare or absent in the HP layers and scrapers uncommon. There are many scrapers in the HP layers at Montagu Cave (Keller 1973*b*), and this also seems to be the case for Umhlatuzana (Kaplan 1990). Much variability is thus evident in HP assemblages, even where sites are geographically close (Wadley & Harper 1989).

Very few true technological studies on MSA material have been completed. Wurz (2002) started this process by documenting variability in the technologies of artefact production in the Klasies River sequence, and developed a technological and biplot-based comparative method in order to delineate differences in MSA technology (Wurz *et al*. 2003; 2005). The initial study (Wurz 2002) shows that the variability in the MSA at Klasies River is due to changes between the dominant blade and/or point technological conventions (traditions) through time. Her analysis of the HP material showed that the

most numerous form of core is a prismatic shaped blade core with elongated volumes. Almost invariably, the blanks were struck from the proximal platform. They are short thin blades with an average length of approximately 44 mm. Most of the HP tool butts are small, plain, lipped and associated with diffuse bulbs. Butt preparation in the form of fine rubbing and step flaking occurs on the dorsal surface close to the butt. This was to ensure the removal of elongated products, probably by direct percussion with a soft hammer. The production of the characteristic backed artefacts involved the selection of whole blades and the application of light backing to shape the blanks into the different typological forms (Wurz 2002).

The raw materials

One of the characteristics of the HP is the increased use of quartz and other fine-grained raw materials, some of which are often described as 'non-local'. At the Klasies River Main Site, locally available quartzite was predominantly used for stone artefact manufacture during the MSA. Small quantities of quartz, silcrete, hornfels and chalcedony were also used, but in noticeably greater quantities in the HP units. The closest silcrete outcrop is more than 20 km away, but several of the pieces termed 'non-local' raw material (Singer & Wymer 1982), especially the hornfels, have cortex, and clearly originate from pebbles collected from the nearby river valleys. It is only in the HP units of the site that there is any appreciable diversity in raw material usage (Thackeray 1989).

A study focussing on the variability in the MSA lithic sequence at Klasies River shows no conceptual differences in the reduction strategies of quartzite and non-quartzite HP cores although the non-quartzite cores show a greater degree of reduction, as they are shorter and thinner (Wurz 2000, 2002). An interesting observation is that frequencies of non-local lithics at Klasies River begin to rise before the technological transition to the HP, in the late MSA II levels, and decline gradually through the end of the HP and into the beginning of MSA III (Ambrose 2002; Singer & Wymer 1982; Wurz 2000). This pattern of change in raw material frequencies preceding change in technology suggests that the invention of small blade technology and backed microliths could have been a response to the potential of fine-grained raw materials. When access to fine-grained raw materials declined, the technology may have been reorganised to accommodate the mechanical properties of coarse-grained local materials (Ambrose 2002; Ambrose & Lorenz 1990). However, too little comparative work has been conducted, and the sites on which the deductions are based are too few for this interpretation to be seen as a blanket explanation for the development or termination of the HP across South Africa.

At Rose Cottage Cave, non-opaline rocks are more frequent in the pre- and post-HP phases. Opaline material is, however, dominant throughout the sequence and the change is therefore slight (Harper 1997). This may also be true for the use of quartz at Umhlatuzana where locally available vein quartz is the primary raw material and seems to have been used more frequently in layers associated with HP and pre-HP layers than in post-HP layers (Kaplan 1990). An indication that the choice of raw material may have influenced the size of artefacts can be seen at Umhlatuzana where large segments and trapezes are mainly made from hornfels, and small segments and trapezes from quartz. At Sibudu Cave local raw materials such as hornfels and dolerite, the most

prolific raw materials used during the post-HP, are also favoured for HP backed tools, with only a few quartz pieces (Wadley in press).

Explanations for the appearance and disappearance of the Howiesons Poort

Singer and Wymer (1982) saw the HP as a break in the continuum, indicating the arrival of a new people with different traditions alien to the earlier and successive occupants of Klasies River. Thackeray (1989) conceded that the appearance of items such as backed segments represents change in the sequence, but argued that the continued presence of typical quartzite MSA flake-blades as an appreciable component of the HP assemblages suggests that the diagnostic HP artefacts signify added typological novelty rather than discontinuity. Similar conclusions have been reached for the MSA sequences at Border Cave and Rose Cottage Cave (Beaumont *et al*. 1978; Harper 1997).

Vishnyatsky (1994) proposed that the seemingly progressive technical and typological elements which distinguish the HP from other MSA industries were cognitively and culturally possible at that time, but were unnecessarily burdensome and complex. Moreover it did not seem indispensable to the HP people who were capable of bringing them into use, but had no cause to. 'The creativity inherent in man led to the accumulating of surplus elements in the "genotype" of culture; these elements, retained in the recessive state, served as a guarantee against unforeseen changes in natural and social conditions' (Vishnyatsky 1994: 138).

For Deacon (1989) the coincidence of the HP horizon with a period of variable and deteriorating environmental conditions suggests that this archaeological phenomenon may be linked to the problems of coping with increasing environmentally related stress. Such stress may have more to do with the maintenance of populations and their social structures under conditions of lowered habitat productivity, than simply coping with colder and drier climates. The release of stress through amelioration of conditions removed cultural selection for the same level of symbolic behaviour, and the technology of the subsequent MSA III industries reverts to type (Deacon 1989).

BEHAVIOURAL HYPOTHESES ASSOCIATED WITH THE HOWIESONS POORT

Hafting and hunting

The uniqueness of the HP is thought to be represented by the introduction of standardised backed tools and the increased selection of high-cost raw materials for the manufacture of these tools (Deacon 1989, 1993; Wurz 1999). The standardisation of artefacts such as segments and trapezes is, according to Deacon (1989, 1993), enforced by hafting. Similar backed tools in LSA contexts are considered to be projectile points related to hunting. There is ethnographic evidence for the hafting of backed tools, especially segments, and for their use as arrowheads by the San (Clark 1977). In the MSA context (given the size of the pieces), however, Hilary Deacon (1989, 1993) proposed that backed tools are more likely to have functioned as spearheads and barbs in composite hunting tools. Janette Deacon (1995) adds the possibility that they could have been mounted with mastic on to a short haft and used as cutting tools. It is, however, acknowledged that these inferences need to be tested in replication and use-wear studies (Deacon, H. 1995; Wurz 1999).

Stringer (1989) agrees with Trinkhaus (1986) that the slight database available indicates that the African Middle Palaeolithic (MSA) hominins may have been more similar to modern humans in their manipulative (handling of objects, including hafting) behaviours than their European contemporaries. It would thus be instructive to have more information on the extent of geographical variation in the Middle Palaeolithic/MSA with regard to the presence of hafting and its association with blade technology. While hafting may have been present in the southern African MSA and the Aterian of northern Africa (Clark 1983, 1989; d'Errico 2003; Inskeep 1978; Lombard 2004, 2005; Volman 1984), blade production in the Eurasian Middle Palaeolithic may have been the result of an extension of knapping techniques used to regulate flake production (Stringer 1989). Although there seems to be little or no evidence for the hafting of tools based on blade technologies during the Middle Palaeolithic, there is some evidence for the hafting of other tool types during this period (Anderson-Gerfaud 1990; Grünberg 2002; Hardy *et al*. 2001; Mellars 1996; Shea 1988). The invention, development or perfection of hafting techniques may well have revolutionised hunting strategies (Binford 1984; Stringer 1989). Gibson *et al*. (2004) used residue analysis to show that HP backed pieces, produced on blades, were probably hafted, but the functional application of these tools, and more specifically their association with hunting, remains to be established.

The Howiesons Poort as an indicator of human adaptability and modern subsistence behaviour

One preferred explanation for the appearance and disappearance of the HP is the environmental adaptability of its makers (Clark 1989; Klein 1989; Vishnyatsky 1994). Change towards a cooler climate at the end of the Last Interglacial may have reduced exploitable biomass, and the predictability of faunal and floral resources. The paucity of data and uncertainties regarding dating and correlation with marine climate sequences precludes an accurate reconstruction of resources for this time period. Nonetheless, the faunal assemblages from Border Cave, Boomplaas and Klasies River all suggest a trend towards more open environments, although a mosaic of open and closed habitats may have been available (Ambrose & Lorenz 1990).

In a variation of the environmental approach Hilary Deacon (1989, 1995) argued that the marking of boundaries and the intensification of social networks would explain the HP in structural terms, rather better than functionalist arguments relating to the need of new tools for new environments. He (Deacon 1989) has also suggested that the economic strategies at sites containing HP tools might even have involved the systematic burning of the local vegetation to encourage the growth of geophytes. A view is offered that the MSA groups in the southern Cape had essentially the same perception of their environment as their Holocene successors. In their subsistence behaviour they show the same reliance on carbohydrate-rich plant foods, supplemented by animal protein and the use of shellfish as a source of nutrients, as found in the LSA. Deacon (1989) concluded that MSA people did not differ from LSA people in their basic subsistence ecology, and that their subsistence behaviour was essentially modern. Deacon and Shuurman (1992) furthermore stated that contrary arguments made on differences in the intensity of resource utilisation between MSA and LSA people may reflect differences in population densities linked to environmental conditions rather than differences in the capacity for modern behaviour.

Ambrose and Lorenz (1990) briefly reviewed the evidence for assemblage composition, chronology, subsistence and environmental change in the MSA of southern Africa, and evaluated the archaeological data in terms of predictive ecological models of hunter-gatherer social and territorial organisation. These models are based on cost-benefit analysis of subsistence and settlement strategies analogous to those applied by ecologists to other mobile animal species. They found that the transition seen between the MSA II and the HP is similar to that seen between the Albany and Wilton LSA industries in southern Africa during the early to middle Holocene. Nonetheless, with the exception of the HP, they found little evidence of diversity in human adaptations prior to 40 000 years ago.

Possible implications of the variations in the use of raw materials

Ambrose and Lorenz (1990) perceived the HP as standing in 'stark contrast' to the other MSA lithic industries in southern Africa because of its use of non-local, fine-grained raw materials and the apparently advanced tool types that were made. They argued that this contrast in lithic raw material use resulted from an expansion of local group foraging ranges and/or the development of inter-group exchange networks. They rejected the alternative hypothesis that change in lithic raw material procurement strategies resulted from the need to use fine-grained raw materials to satisfy the requirements of the microlithic technology. They did, however, recognise the fact that the published database is remarkably sparse despite the ease with which raw material frequencies can be recorded. Hence, the hypothesis favoured by them is only weakly supported. More MSA and LSA sequences need to be examined and compared in order to determine if the pattern in raw material use may be spurious. If their hypothesis is correct, Ambrose and Lorenz (1990) propose that the HP marks the first time in human history when there was a significant change in human territorial organisation. This change in interaction patterns is considered to have obvious implications for patterns in gene flow and the transmission of cultural information across the African landscape.

Evidence for human modernity based on Howiesons Poort technology and style

Foley and Lahr (1997, 2003) argue in their 'Mode 3 Hypothesis' that the development of MSA or Mode 3 technology (flake tools made from prepared cores) is of greater universal significance than the origins of the Upper Palaeolithic (Mode 4, punch-struck blades with steep retouch) in documenting the origins of modern human behaviour. They point out that Mode 3 technology is associated with anatomically modern human remains in southern Africa, and that 'Upper Palaeolithic (or Mode 4) elements' such as HP artefacts, occur within Mode 3 sequences. Accordingly, they suggest that the development of MSA rather than LSA technology marks a major cognitive development associated with the biological changes leading to the evolution of modern humans.

Behavioural implications of the variability in stone tool technology during the MSA in southern Africa are also interpreted as evidence of social mechanisms to cope with circumstances of stress. The stylistic changes through the sequence at Klasies River and the novel use of raw materials and backed tools in a transient HP sub-stage of the MSA are interpreted as evidence for such social mechanisms (Deacon & Shuurman 1992; Wurz 1999). A considered reason for the use of non-local raw material is that the

cost of procurement of these materials may have added value to the composite artefacts of which they were part. In an ethnographic context, San projectile points are considered active communicators of style (Wiessner 1983) and this analogy serves as basis for the argument that the HP backed tools had a similar symbolic role (Wurz 1999). The 'non-functional' elaboration of artefacts is said to provide some of the best evidence for an ability to 'switch on and switch off' social signalling parallel to behaviour shown by LSA people (Deacon & Shuurman 1992). According to Deacon (1989), this is convincing evidence for modern social behaviour during the MSA.

Nevertheless, there is no consensus on the idea that HP technology necessarily equals evidence of cultural modernity. According to Wadley (2001), the HP does not display active style with the rapid turnover, similar to that of the LSA, necessary to indicate symbolic behaviour. If the HP backed blade production was an important marker of modern human behaviour it is difficult to explain why it should have lasted for about 20 000 years only to be replaced by 'pre-modern' technology. Wurz (2002) on the other hand argues that the HP may have a duration of no more than 15 000 years (Deacon & Wurz 1996), and this would be of the same order as the duration of the Robberg sub-stage in the LSA (Deacon & Deacon 1999).

According to Henshilwood and Marean (2003: 635–636), linking artefact style to modern human behaviour is contentious. The series of operations involved in artefact manufacturing reflects not only socially constructed patterns of thinking within a community, but also provides evidence for changes in subsistence strategies and manufacturing techniques. Encoded symbolic meaning only emerged with the advent of specialised craftsmen whose products conveyed stylistically and ideographically encoded information about function, ownership, and manufacture. Moreover, blade replication experiments by Winter (2000) have shown that HP blades are unlikely to have been produced by the sophisticated punch technique that was initially suggested by Wurz (1997). Winter (2000) suggests that the hard hammer technique is the most likely method used for the production of the small blade blanks at Rose Cottage Cave. He concludes that the attributes and knapping technology of the Rose Cottage Cave HP flake-blades cannot be viewed as a marker of culturally modern behaviour. It is rather seen as an adaptation of existing knapping strategies to obtain straight-edged flake-blades, in the most efficient way, from small nodules of opaline raw material. Thus, Winter (2000) argues that the existence of the HP does not necessarily reflect the product of cultural modernity.

Standardisation and symboling

The attribute analysis of the backed artefacts from Klasies River indicated that the HP backed tools are design types (Deacon 1972) that are as standardised as those in the LSA (Wurz 1999). Byers (1994) considered standardisation as evidence of symboling, because standardisation is thought to indicate that behaviour has been guided by conventional social rules. Because the particular types of standardised artefacts are restricted to HP levels, Wurz (1999) interprets the industry as behaviour guided by such social rules. Chase (1991) has cautioned that standardisation can only be interpreted as evidence of symbolic behaviour if technology can be excluded as determinant, since blade technology in itself can lead to the production of standardised forms. This cautionary argument is discarded by Wurz (1999) because in the case of the HP at

Klasies River blades were produced over a wide size range, but only a narrow range was selected for the production of backed artefacts.

Another caution offered by Chase (1991) and Mellars (1991) is that standardisation is not an indication of symbolic behaviour if the standardisation is determined by the demands of function, as in hafting. Wurz (1999) recognises that attachment to a handle may indeed require some degree of standardisation of size parameters to ensure a secure fit. However, she points to the fact that there is evidence (Boëda *et al*. 1996; Odell 1988) for the hafting of a wide range of artefacts in prehistoric times. She goes on to argue that in the MSA there was a range of possible hafted-backed-tool shapes, each derived by following a different set of rules. The choice of which rules to use was not limited by the requirements of hafting, but by changing social rules (no validation is, however, provided for these arguments). This is interpreted to show that the standardised, backed artefacts of the HP indicate symboling, and thus, modern behaviour (Wurz 1999).

The Howiesons Poort and the origins of hxaro and San click languages

> 'Were backed microliths Small Things Remembered, explicitly symbolising bonds of mutual reliance and reciprocity? In other words, were finished backed microliths given as gifts in formal delayed reciprocity systems like that of the Kalahari San?' (Ambrose 2002:19)

Deacon (1989) suggested that the standardised backed artefacts in the HP could have played the same role in boundary marking and gift exchange as social mechanisms to maintain populations and cope with stress, as hafted metal projectile points do amongst the modern Kalahari San. The *hxaro* gift-giving partnership system of the Kalahari San described by Wiessner (1983) serves to reduce risk in unpredictable, unproductive environments. Deacon's hypothesis (Deacon, H. 1992, 1995; Deacon & Wurz 1996) explicitly proposes symbolic and social uses of exotic, fine-grained lithic raw materials, and suggests that delayed reciprocal exchange of composite tools with backed segments played an important role in the origin of the earliest backed microlith technologies. The conclusion is that the San *hxaro* system originated during the HP.

Some of the premises of the HP equalling symbolic behaviour argument can be questioned. There is no question that there is evidence of planning, symmetry, and aesthetics in MSA artefacts, but the patterning in the sequences is best described as isochrestic (a range of equally viable options or equivalent alternatives) (Sackett 1982, 1985), rather than being considered iconological (Thackeray, A. 1989, 1992). Ambrose (2002) suggests one way of testing the Deacon and Wurz *hxaro* hypothesis (Deacon, H. 1992, 1995; Deacon & Wurz 1996; Wurz 1997, 1999, 2000). He proposes that embedded procurement and down-the-line exchange of fine-grained non-local raw materials would have involved the transport of cores rather than finished artefacts. If so, the proportions of finished tools to debitage should be similar to those for local raw materials. However, if finished backed artefacts were exchanged (necessary for *hxaro*) the ratio of tools to debitage should be much lower than for locally available materials. Data provided by Wurz (1997) for Klasies River show an increase in fine-grained raw materials for backed segments, but debitage to shaped stone tool ratios for these raw materials seem similar to those for local ones (Ambrose 2002).

Some researchers (Ambrose 1998; Barut 1994) suggest that the *hxaro* gift-exchange system hypothesised for the HP backed tools on exotic raw materials (Deacon, H. 1992,

1995; Deacon & Wurz 1996) can only be indicated by exclusively non-utilitarian items such as ostrich eggshell beads, or marine shell beads (Henshilwood *et al.* 2004). Even then, their existence may indicate some form of gift exchange, but not necessarily involve the complexities of *hxaro* (Mitchell 1996). Although exotic fine-grained raw materials and shaped stone tools may have acquired symbolic value during the late MSA, they probably still retained functional value (Ambrose 2002). Mitchell (2003) furthermore cautions against the perception that *hxaro,* as documented amongst some groups, is a universal synonym for any form of exchange practice in LSA hunter-gatherer societies. He points out that *hxaro* is not universally practised in all contemporary Bushman societies. Instead, he suggests a greater awareness of the diversity of social practices by which goods are moved between individuals or groups, and emphasises that different kinds of exchange are, in fact, well documented in the literature. Even in the LSA archaeological record *hxaro* can not easily be identified. Instead, formal analogies are drawn between items favoured by Ju/'hoãnsi for exchange, assuming that the social context of the one can be mapped on to that of the other. Only once we have a much clearer picture of what was moving where and when, could we make comparisons with other evidence for interaction, for example regional artefact styles and lithic raw materials (Mitchell 2003).

The presence of the HP has recently also been linked to language. According to Deacon (2001), the geographic distribution can be compared to that of LSA San naturalistic rock art and of so-called 'click language' speakers (Deacon 1992). The concordance even extends to a possible outlier in the Mumba Industry of central Tanzania where naturalistic art is also recorded and click language speakers are still resident. Deacon (2001) recognises the possibility of a high level of continuity, genetically and culturally, between early modern peoples in the Late Pleistocene and recent populations in this part of Africa. The similarities in style of the artefact production in the HP are perceived as evidence for a communication network and by extension the spread of a common language. Click languages are unique to this part of Africa, and it is believed entirely possible that they were spoken in an ancestral form in the Late Pleistocene. (Deacon fails though to explain the gap represented by the existence of post-HP MSA assemblages.)

He (Deacon 2001) quotes Nichols (1997) for his linguistic claims for the location of the origins of these languages, and Cavalli-Sforza (2000) also includes the Hadza and Sandiwe of Tanzania in the group of Khoisan speakers, although their genes today are unlike that of the South African Khoisan. However, it should be recognised that at best the Hadza and Sandiwe are distant members of the same language family as the various Bushman and Khoe languages. The conclusion that they belong to the Khoisan language group is by no means universally accepted by linguists (Blench 1997; P. Mitchell pers. comm.). The linguistic evidence is unclear and the clicks that are found in east Africa may represent the remains of ancient linguistic phonemes rather than remnants of Khoisan languages (Morris 2003). According to Morris (2003) more recent studies of archaeological osteological specimens and living east Africans have not confirmed any Khoisan linkage with east Africa. Henshilwood and Marean (2003) also caution that tools, tool-making style, and the use of specific raw materials are not necessarily representational or communicative in the same sense as language. They do not necessarily have implicit communicative functions.

The Howiesons Poort as origin of San spirituality or shamanism

Lewis-Williams and Pearce (2004: 5) interpret the HP as 'the deepest identifiable roots of spirituality'. They reject notions of climatic change or technological development as possibilities for the appearance and disappearance of the HP. The spiritual hypothesis is built around the qualities, other than technological efficiency and ease of flaking, of the 'new' raw materials used during the HP. According to them, it is the shiny, translucent, qualities of the chosen materials that contain their answer to the HP question. They endeavour to give this suggestion substance by linking the 'glistening' nature of the stones to something fundamental in the functioning of the human brain.

Ethnography from Australia, North America and South America is cited to illustrate why shamans and seers throughout the world find shiny stones such as quartz crystals significant. It is implied that shamans see in the glistening stones the light that they experience during altered states of consciousness, and they (the shamans) therefore ascribe special properties to the stones. However, Lewis-Williams and Pearce (2004: 29) do acknowledge that there are no historical or ethnographic records of the ritual use of quartz crystals by the San, and that the period is so distant that 'anything we observe in communities today will be of doubtful relevance'. Nonetheless, they continue to hypothesise that the shiny raw materials used during the HP period were selected because they had spiritual significance. The shiny, often translucent nature of the substances seems to suggest, or, given appropriate social and psychological circumstances, even trigger, specific electrochemical responses in the neurology of the brain. Because the people of the southern African MSA were anatomically modern by 70 000 years ago, Lewis-Williams and Pearce (2004) argue that their brains too must have had the potential to be triggered in the same ways as people of today. Within this context, however, they fail to recognise that people of today do not all perceive glistening stones in the same way, or associate them with altered states of consciousness, and that such variations may also have been possible in the past, exactly because their brains had the same potential as ours. Spirituality is thus only one alternative amongst many possible explanations.

Practical uses of the pieces are not precluded in the hypothesis, and it is assumed that the segments were 'almost certainly' used as barbs for spears. Yet, it is argued (Lewis-Williams & Pearce 2004: 20) that even in practical usage the tools were imbued with spiritual significance, perhaps to enhance the effectiveness of the spear of which they were part. It is furthermore suggested that the HP may be explained by a belief system that was linked to social differentiation. This delineation existed between, on the one hand, 'seers' or shamans, who could 'see', and who employed the glistening stones for spiritual purposes and, on the other, those who depended on the seers for healing, supernaturally derived information, success in hunting, rain-control, and similar beliefs.

In trying to answer why the HP disappeared, they speculate that the whole industry did not come to an end, but that people abandoned shiny raw materials and the small segments and trapezes they made from them. The artefacts were 'special' because of the inextricability of social relations and the beliefs on which they were founded. If, through social changes and interrelated shifts in beliefs, the raw materials lost something of their power, then the artefacts too may well have come to be seen as ineffective. Thus, once beliefs about the spiritual efficacy of the raw materials had passed, the distinctive artefacts into which they were made also ceased to be significant—the HP drew to a close (Lewis-Williams & Pearce 2004).

Yet, by no means do all scholars accept the idea that the human brain was behaviourally fully modern during the HP. According to Klein (2002), the relationship between anatomical and behavioural changes shifted abruptly only at about 50 000 years ago. Before this time, anatomy and behaviour appear to have evolved more or less in tandem, very slowly, but after this time anatomy remained relatively stable while behavioural (cultural) change accelerated rapidly. It is suggested that a genetic link between anatomy and behaviour in earlier people persisted until the emergence of fully modern ones. This postulated genetic change 50 000 years ago fostered the uniquely modern ability to adapt to a remarkable range of natural and social circumstances with little or no physiological change. It may also have promoted the modern capacity for rapidly spoken phonemic language. This could mean that the complex spiritual behaviour suggested by Lewis-Williams and Pearce (2004) may not have been possible before the genetic shift suggested by Klein (2002). Both these hypotheses remain almost impossible to verify. In the case of the HP, all we have are the stone tools, and in the next section, I briefly discuss the problems of linking the existing archaeological data on raw material with spirituality. It needs to be said that the interpretation suggested by Lewis-Williams and Pearce (2004) is highly speculative and contentious. It deserves a full critique that is outside the scope of this paper.

THE CURRENT THRESHOLD AND THE FUTURE

This review shows that Klasies River is the site that by far has provided the most information contributing to our current knowledge, and towards a potential understanding of the meaning of the HP. It is, however, crucial that a series of similar analytical studies are performed on other appropriate MSA assemblages for comparative reasons. Only with accurate comparable data can hypotheses covering broader behavioural aspects, and a finer understanding of the technological development of the HP—for example, Wadley and Harper's (1989) inkling that the Rose Cottage Cave HP may contain a developmental sequence comprising two or even three phases—be adequately evaluated. Such studies should include finely honed typological and technological analyses (e.g. Thackeray 1989, 2000; Thackeray & Kelly 1988; Villa *et al.* 2005; Wurz 2002), ecological reconstructions based on charcoal and seed analyses, in addition to faunal analyses (e.g. Allott 2004; Wadley 2004), functional studies (e.g. Gibson *et al.* 2004; Lombard 2005; Lombard *et al.* 2004), and predictive cost-benefit analyses of subsistence and settlement strategies (e.g. Ambrose & Lorenz 1990).

Parkington's (1990) concerns seem legitimate, and not all HP assemblages need be the same age. However, if HP-like industries appeared at several points in time then one would expect them to occur more than once in some long single stratigraphic sequences such as Klasies River, Border Cave or Sibudu Cave; this situation has not as yet been documented (Ambrose & Lorenz 1990). Current typological analysis of the stone tools from the final MSA layers from Sibudu Cave shows that backed tools are an uncommon retouched tool type (e.g. scrapers 30.0%, points 26.4%, backed tools 8.5%), but are present in small frequencies in almost all the final MSA layers (Wadley in press). The presence of these tools in the final MSA of Sibudu is noteworthy, but it does not imply that a HP component is represented. Nor does the backed tool presence imply contamination from above because there is no LSA occupation at Sibudu Cave. The

backed tools appear to be an integral part of the late MSA at the site. Although backed tools, particularly segments, are the acknowledged markers of the HP, assumptions cannot be made that the presence of a few backed tools in an assemblage signifies the HP. The HP assemblages that have been carefully excavated in small stratigraphic layers usually contain very high percentage frequencies of backed tools relative to other tool classes. At Rose Cottage Cave for example the HP layers, excavated in minute stratigraphic lenses by Harper (1997), contained high percentages of backed tools and a near absence of other tool classes (Wadley in press).

Lack of accurate dates has precluded the study of contemporary patterning in MSA assemblages. With new TL and OSL dating methodology it may be possible to accumulate a suite of dependable MSA dates, and re-assess previous dates, in order to create a comparable database (Jacobs, Duller & Wintle 2003; Jacobs, Wintle & Duller 2003; Lombard 2005; Roberts 1997; Wadley & Jacobs 2004; Wintle 1996; Valladas *et al*. in press). The number of dates currently available is rather small because the number of HP sites dated is still fewer than ten (Valladas *et al*. in press). As more dates that are accurate become available, there is a need also for the re-assessment and closer definitions of the changes that took place in the stone tool assemblages over this period. According to Vogel (2001) only then will it be possible to make meaningful advances in the interpretation of the development of early human behaviour in sub-Saharan Africa.

From a theoretical perspective, the HP itself may need closer definition. If seen as a technology occurring in the South African MSA sequence, defined by the presence of backed tools, a number of problems arise for the interpretation of other backed tool assemblages (L. Wadley pers. comm.), some dating as far back as 300 000 years ago and associated with *Homo heidelbergensis* (Barham 2002). This may be especially problematic when the HP backed tools are seen as an indicator of modern behaviour as suggested by Deacon (1989) and Wurz (1999)(Wadley in press). The term 'phase' may be considered a more appropriate definition. A phase is an 'archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilisations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time' (Darvill 2002: 320). But, can 15 000 or 20 000 years be considered a brief interval? A 'period', defining a major block of time that may contain several phases and pertain to a wide area is another option, but more analytical work needs to be conducted to establish the existence of various phases within the HP. Valladas *et al*. (2005) prefer the term 'techno-complex'. This describes a group of distantly or unrelated cultures sharing the same general families of artefact types as a widely diffused and interlinked response to common factors in environment, economy and technology. This definition provides more scope for the interpretation of backed tool assemblages such as the HP and those occurring elsewhere and at different times during the MSA in sub-Saharan Africa.

Previous assumptions about whether HP backed tools were hafted or what they were used for were based almost entirely on recent ethnographic examples—a practice that can be considered awkward if the time-depth that these analogies are supposed to bridge is considered. It is therefore necessary that programmes are developed to generate data directly from HP artefacts. Recently, Gibson (Gibson *et al.* 2004) performed microscopic residue analysis on a sample of HP tools from Rose Cottage Cave. Although the sample

had been labelled and was therefore not ideal for residue studies, it provided valuable first empirical evidence for the possibility of tools from the HP being hafted and the use of ochre in the mastic recipe. Refined analytical methodology for archaeological residue studies (Lombard 2004; Wadley, Lombard & Williamson 2004) and the incorporation of focussed functional studies based on use-wear and macro-fracture analyses (Hardy 2004; Lombard 2005) may begin to generate detailed data for the possible functions and hafting technologies of HP tools.

The innovative and functional value of these tools is often downplayed in order to validate other behavioural hypotheses (Deacon 1989; Deacon & Shuurman 1992; Lewis-Williams & Pearce 2004; Wurz 1999). However, sites with long MSA sequences containing HP tools, such as Rose Cottage Cave (Wadley & Harper 1989), Umhlatuzana (Kaplan 1989*b*, 1990), Klasies River (Singer & Wymer 1982), Border Cave (Beaumont 1978) and Sibudu Cave show a distinct decrease or absence of non-backed formal tool types such as unifacial and bifacial points during the HP, increasing again during the post-HP layers. Functional studies performed on a post-HP point sample from Sibudu Cave provided multi-stranded evidence that points were used as hafted spearheads during that period (Lombard 2004, 2005). This, together with the prolific faunal sample excavated from the HP layers at the site, strongly suggests that the HP backed tools could have been substitutes for previous and subsequent hunting tools. Evidence for effective hunting practices, sophisticated hafting technology and the use of composite stone tools are in themselves valuable behavioural and cognitive indicators (Ambrose 2001; Barham 2002; Binford 1984; d'Errico 2003; d'Errico *et al.* 2003; Klein 2000; Lombard 2005; McBrearty & Brooks 2000; Mellars 2005; Odell 1996; Stringer 1989; Stringer & Gamble 1993; Trinkhaus 1986).

Testing mechanisms for inferences based on abstract ideas such as style and standardisation (Marks *et al.* 2001) should be used or established (where possible) in order to create an empirical or at least a more widely supported database for such suppositions. Although Wurz (1999) indicates that some metric parameters of backed tools from Klasies River show a comparable degree of variation to their LSA counterparts, clearly not all the parameters or all the tools show this correspondence, and similar studies have not been conducted for any other site. According to Anne Thackeray (1992) and Lyn Wadley (pers. comm.), the HP backed artefacts appear standardised, but they may well have a wide range of sizes and shapes, so that the standardisation of these tools is probably more a question of perception than a tested premise. Thus, the degree of standardisation evident amongst HP backed artefacts could be overstated in the current literature.

It may also be premature to reject cautionary notes on the assumption that standardisation and style equals symbolic behaviour for the whole HP where data justifying such rejection is based only on a sample from one site (Chase 1991; Mellars 1991; Wurz 1999). Where the hypothesis for standardisation equalling modernity was empirically tested between Upper Palaeolithic tool samples associated with either Neanderthals or *Homo sapiens*, there were simply too many mundane variables that had to be accounted for. As a result, it appears that the degrees of within-tool-class standardisation are best explained in terms of specific adaptive situations, rather than by any inherent differences between the hominids in question (Marks *et al*. 2001).

A further area for more detailed investigation is the use of raw materials. Maybe Mitchell's (2002: 81) use of the term 'enhanced' for the increase in 'non-local' raw materials used during the HP reflects a more realistic impression than the idea that is so often created in the literature by the term 'preferred'. What makes rocks non-local is also unclear. Different patterns of movement and changes in how sites and their surroundings were utilised could have altered the procurement strategies of their inhabitants (Mitchell 2002). At Klasies River 73% of the raw material used during the HP (1967–1968 excavation) is still traditional 'local' material also used during the pre- and post-HP sub-stages (Wurz 1999). A similar pattern also seems to be the case for Border Cave, Rose Cottage Cave, Umhlatuzana and Sibudu Cave where even higher percentages of raw material used during the HP can be described as 'local'. It would also be interesting to establish whether at these sites the frequencies of non-local lithics begin to rise before the HP, and decline gradually through the end of the HP similar to the raw materials used at Klasies River.

For hypotheses such as the shamanistic/spiritual interpretation of Lewis-Williams and Pearce (2004) that rely only on the presence and use of very specific raw materials, there presently exists precious little empirical evidence. Of 14 246 pieces from Klasies River analysed by Wurz (1999) only a minute percentage (0.08%) of the material is crystal quartz (Wurz 1999). For retouched tools, those that could have been made into 'spiritually imbued' composite tools, this percentage is even smaller (0.03%). No direct data on the percentage of crystal quartz used during the HP of other sites currently exists. This raw material is very often documented together with regular quartz that can usually not be described as 'glistening, shiny or translucent' (Beaumont 1978; Kaplan 1990). As not all chalcedony or opaline pieces possess the qualities necessary for the shamanistic/spiritual interpretation, the current breakdowns for the use of raw material at sites such as Border Cave or Rose Cottage Cave cannot be used. At Rose Cottage Cave opalines, whether clear or cloudy, are used throughout the sequence, in pre-HP, HP, post-HP and all LSA units (L. Wadley pers. comm.) and at Sibudu Cave, most HP backed pieces are made on dolerite and hornfels, not quartz. A re-analysis of the raw materials according to specific criteria is needed to sustain the spiritual interpretation. Even if tools made of glistening raw materials are present, their mere existence cannot be seen as evidence for spiritual behaviour or shamanism, in the same sense as that the mere presence of ochre in MSA contexts cannot automatically and exclusively be equated with ritual and symbolic behaviour (Wadley, Williamson & Lombard 2004). Only where additional strands of evidence clearly indicate symbolic behaviour, for example the engravings on ochre pieces from Blombos (Henshilwood *et al.* 2002), can such inferences be made.

In recommending testing or evaluation mechanisms for the proposed models, I do not dispute them. Such models are considered crucial for moving forward. Archaeological data are fragmentary—the cultural remains inevitably under represent what happened in the past. Realistic hypotheses and models must therefore, of necessity have more content than that which we can possibly excavate, analyse or test (Huffman 2004). However, hypothetical models need to be strengthened, where necessary re-assessed, and appropriately evaluated with 'ampliative' criteria as discussed by Huffman (2004) in order to improve our knowledge of the past.

CONCLUSION

We have come a long way in understanding the HP since the 1920s. The existence of the HP in South Africa during a period that can be considered crucial for the development of modern human behaviour provides scholars with unique research opportunities. More importantly, it requires profound responsibility to ensure that hypotheses based on theoretical models, inferences based on slight threads of data, and assumptions about human behaviour 70 000 years ago, do not become entrenched as established facts in the literature, without the proper evaluation, peer reviews, re-assessments or at least some form of empirical testing. The transmission of complex knowledge across generations and the spread of innovations, are seen as key to modern human culture. But, I agree with Sally Mc Brearty (2003) that we must develop appropriate criteria and accumulate sufficient field data to recognise meaningful innovation and to determine when the behaviour we observe is complex enough to be deemed 'modern'. That is the task ahead.

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