What is Still Bay? Human behavioural variability and biogeography reflected in Southern African Middle Stone Age bifacial points

Archer, W.B.S.D.

Author: Archer, W.B.S.D.
Title: What is Still Bay? Human behavioural variability and biogeography reflected in Southern African Middle Stone Age bifacial points
Issue Date: 2017-01-17

4. Assessing historical connections in southern African Middle Stone Age techno-traditions.

Over the last two decades, and persisting into the present, much attention has been devoted to refining the spatial and temporal structure of the Middle Stone Age ("MSA") sequence of southern Africa. This practice largely equates to documenting discrete variability in the material record in accordance with an ordinal set of culture-historic units (hereafter "units"), fitting known sites and sequences within this framework, and regularly updating the distribution of units in space and time in accordance with the availability of new field data. Within this process there tends to be a preoccupation with assemblage similarities rather than differences, and once assemblages are classified within specific units, questions of potential (a) internal variability and (b) deviation from original techno-traditional attributions are seldom revisited. Very little consideration is paid to the possibility of continuous variability between recognised techno-traditional units. However, the broader characteristics uniting different spatial occurrences of these units were defined 85 or more years ago. Today these remain largely unchanged in respect to their defining elements and in the way that researchers identify assemblages in accordance with these elements (Goodwin and van Riet Lowe, 1929; Lombard et al., 2012).

The refinement of two MSA units, known formally as the "Still Bay" and "Howiesons Poort" ("SB" and "HP"), have received disproportionately more recent attention than other units, due largely to the extraordinary cultural features they exhibit, as well as the varying levels of significance accorded by researchers to these features. The SB and HP are referred to widely as discrete "techno-traditions", the former broadly defined by specifically shaped bifacial points and the latter by various forms of backed pieces, occasionally but not uniformly embedded in a laminar-like blank production system. The SB and HP are also characterised by an array of non-lithic cultural elements, although researchers rely on lithic features to recognise instances of these techno-traditions in the archaeological record.

In terms of their broader implications, what exactly are the meanings of techno-traditional unit names? The use of units to partition variability in the material record is underpinned by a series of assumptions which vary among researchers. Technological similarity between spatially separated synchronic occupations is generally interpreted to represent population interaction and cultural transmission, either underpinned by branching (i.e. descent/dispersal), or blending processes (diffusion). These demographically connected, spatially separated occupations are largely assumed to be constituents within a landscape scale techno-tradition. Less attention is paid to the ecological determinants of lithic variability and to the possibility that they could drive unconnected groups to converge on the same technological solutions (i.e. independent origins for the same technologies).

However, units also serve as important mechanisms to communicate similarity in finds between the excavators of different sites and between the analysts of various excavated assemblages. This makes it difficult, therefore, to excavate southern African sites or work on southern African MSA materials without conceding to the use of unit labels in some classificatory respect. Instead, for example, of referring to an MSA sequence containing a bifacial point industry followed by one characterised by backed pieces, researchers tend to say they have a "Still Bay" and "Howiesons Poort" despite the internal variability and potential overlap these assemblages may exhibit on closer inspection (see for instance Porraz et al. 2013a; 2013b; Texier et al. 2013; Wadley and Mohapi, 2008; Archer et al., 2015; 2016). The central problem is that as soon as assemblages are dated and given techno-traditional names, researchers tend to be less interested in the internal variability they exhibit. This interpretative tendency seems to persist even in the face of fairly substantial and currently unresolved controversies associated with the dating of MSA techno-traditions (Mackay et al., 2014; Jacobs et al, 2008, 2015; Tribolo et al., 2009, 2012; Guérin et al., 2013; Feathers, 2015; Murray-Wallace, 2015), which suggests that the dates of assemblages form part of the definition of whether they can be classified as Still Bay or Howiesons Poort.

The practice of 'unit building' implies, in many contexts, that assemblages considered to fall within a certain unit due to their stylistic similarities were produced by a culturally discrete group of modern humans who probably saw themselves as such (Lyman et al., 1997:11). Thus it is inferred that there is a measure of historical connectedness between these assemblages. Importantly, some researchers try to minimize the assumptions of unit building by rather referring to 'techno-complexes', although the ways in which techno-complexes vary from techno-traditions in terms of their behavioural assumptions are seldom stipulated. The broader issue concerns whether calling units by different names actually changes the ways in which these units are treated. In other words if one of these units is called - for example - a 'techno-complex' yet is still treated like a 'techno-tradition', this would suggest that researchers have not fully absorbed the inferential differences between techno-traditions and techno-complexes.

The demographic implications of cultural labelling tend to be rigid. Consequently these open up the archaeological record to over-simplification by researchers unfamiliar with the intricacies of different collections and perhaps also foster the drawing of misplaced demographic inferences, such as cultural connections and fragmentations through time and across space. The nature of inferred similarities between units identified at different sites – whether these similarities are structural and therefore perhaps are reliable or are just superficial (Kroeber, 1931) – has received little attention in the southern African context. To summarize, we know little about the specific drivers of similarity and variability between units across substantial expanses of space and time.

The chronology of units relative to one another has also been the subject of relatively recent clarification in respect to newly excavated sites and the emergence and application of relatively new dating techniques to the MSA (Wadley, 2007; Jacobs et al., 2008b; Tribolo et al., 2009; 2013; Högberg and Larsson, 2011; Guerin et al., 2013; Lombard et al. 2010). Recent radiometric dating has pinned the SB and HP to late Pleistocene periods in southern Africa potentially closely preceding the expansion of modern humans into Eurasia and Australia (Jacobs et al., 2008b; Mellars 2006a, 2006b; Mellars et al., 2013). The recent ages in light of the cultural characteristics of the SB and HP suggest that these units represented extraordinarily innovative and chronologically discrete but short-lived periods relative to preceding and succeeding MSA units. At the time when seemingly reliable dates became available this established ordinal system probably arose, as Conard et al. stated, as a consequence of the "longing for order and clarity in what had previously been a complicated and uncertain cultural sequence" (2014: 124).

A number of inferences have generally been drawn from the chronological delineation of the SB and HP. The first concerns the rate of cultural change through time in the MSA and the elevated tempo that the SB and HP are suggested to signify (Jacobs et al, 2008a; Jacobs and Roberts 2009; Henshilwood and Dubreuil, 2011; Henshilwood 2012). Importantly, although the onset of the SB and HP are assumed to represent elevated tempos of technological change, actual assemblages from the archaeological layers representing the units themselves are traditionally regarded as being diachronically homogeneous i.e. little to no recognisable internal variation through time within the SB or the HP (but see Wadley and Harper, 1989; Vanhaeren et al., 2013; Discamps and Henshilwood, 2015). The second inference concerns the spatial extent of specific demographic networks across different regions of southern Africa that are inferred from the relative contemporaneity of so-called *fossile directeurs* of the SB and HP in the archaeological record (Wadley, 2007; Powell et al., 2009; Lombard et al., 2010, 2012; Jacobs and Roberts, 2009; Mackay et al., 2014). These inferences remain widely intact and are only infrequently assessed critically in terms of the validity of using these markers to infer Middle Stone Age population dynamics.

Ecological parameters such as raw-material availability as well as activity scheduling and mobility – which vary as functions of space and time in the archaeological record – have established and unavoidable effects on lithic assemblage composition and tool morphology (Hayden, 1977; Dibble, 1987; Torrence, 1989; Bousman, 1993; Bleed, 1997; Shott, 2005; 2007; Shott and Ballenger, 2007). However, these effects are seldom if ever taken into account when assigning a unit name to a purported SB or HP assemblage. The component of variability that persists once these effects are controlled for remains largely unclear in the many contexts where a common label has been applied to assemblages from sites which occur in different ecological niches. This potential association problem is particularly pertinent in new assignments of identities and labels to sites/assemblages which stand to enlarge the temporal or spatial hull that encompassed the known instances of these assemblages in the record.

Relatively recent studies of Still Bay and Howiesons Poort assemblages have rendered their temporal and spatial structures more complex than previously assumed. What were first thought of as short-lived, chronologically constrained, unusually innovative phases associated with a single cultural group across southern Africa do not now seem to be compatible with a growing body of newly excavated field data, new dates, and the results of newly available lithic analysis methods. This increased level of complexity has implications for the use of these units or their *fossile directeurs* to map the emergence and movement of associated demographic groups within and outside of Africa.

For example, the sequence at Diepkloof Rockshelter suggests a regionally specific origin and *in situ* local evolution of the Still Bay and Howiesons Poort complexes on the southwest coast of southern Africa (Porraz et al. 2013a; 2013b; Texier et al., 2013). This development of the SB and HP could have occurred independently of the emergence of SB and HP-like assemblages at other southern African MSA sites. The ages and depth of the sequence at Diepkloof additionally suggest a more enduring lifespan for the HP and SB techno-traditions than the synthetic age model proposed by Jacobs and colleagues (2008) (Tribolo et al., 2009; 2013; Conard et al., 2014).

In nominal cultural-historic terms, Diepkloof has the very same sequence of SB and HP techno-traditions as other key sites in southern Africa such as Peers Cave, Sibudu and Apollo 11 rockshelters. Yet most researchers would agree now that the terms ‘Howieson’s Poort’ and ‘Still Bay’ in their conventional formulations are not suitable labels for the Diepkloof sequence. The temporal scale and implied tempo of change at Diepkloof look completely out of sync with Middle Stone Age cultural-historical sequences across the rest of southern Africa.

These classificatory issues are neither new nor unique to the southern African MSA. Yet they raise important questions regarding the spatial and temporal scales at which it is appropriate to name assemblages as Still Bay or Howiesons Poort. The answer to this question hinges on inter-assemblage variability, how reliable techno-traditional markers are for the groups that produced them, and further, at what scale this reliability starts to decline.

The question of appropriate scale applies not only to time and space, but also to diagnostic tool morphology. For example, the question of whether a biface is ‘Acheulean’, ‘Clovis’, ‘Solutrean’ or ‘Still Bay’ refers to a morphological spectrum – which interacts with the scales of space and time - and consequently enables researchers to slot bifaces into specific techno-traditional units. This morphological spectrum and where different types fall along it is seldom quantified let alone even discussed. This is particularly so in the classifying of artefacts which appear in an expected chronological interval, i.e. if a bifacial point appears in ~70-77ka levels it is probably a Still Bay point.

When, in short, are lithic artefacts suitable proxies for demographic groups? Modern humans are unlikely to have been moulded in their decision making entirely by the ecological variability that they experienced across space and through time, but we know from studies of modern hunter-gatherer groups that ecological variability had a profound effect on technological variability (e.g. Binford, 2001; Kelly, 2013). The effects of certain variables, such as raw-material availability for example, on lithic form are, therefore, unavoidable. The question of when – and under what circumstances - ecologically related variation pushes artefacts and assemblages in and out of established culture historic groupings remains open in most contexts. Regrettably, to many researchers, this question is not of interest. The broader issue of how much ecological context influences lithic variability has been debated heavily in some areas, such as within the Mousterian debate of south western France and debates concerning drivers of techno-traditional variation in the southern African Holocene record (Deacon, 1976; Parkington, 1976). However this broader issue has received much less attention in the southern African MSA.

If one controls the influence of factors which vary with space and time, such as the effect of raw-material type on tool form, for example, one would expect the components of variability that are closer to being in essence cultural to be more visible. But how can we predict what cultural variability should look like? A stepwise application of this broader approach can be referred to as Isaac's (1989) 'method of residuals', whereby the most parsimonious independent variable that could potentially explain a given pattern is tested against a spectrum of documented technological or morphological variability. The residual variability is then compared against the next most parsimonious independent variable and so on until variation could plausibly be attributed to stylistic or culturally conservative tendencies. However there is little theory to tell us what cultural variability should look like in the absence of the effects of ecological variables on technological variation. In the context of the southern African MSA, one way to examine this is to control the effects of ecological variables on the technological markers that are traditionally used to identify the SB and HP, such as backed pieces and bifacial points. In this way the different components of variability associated with these complexes can be isolated, and the residual variance can be viewed with greater precision in the relative absence of the effects of ecological context. One can then draw out with more confidence the demographically significant similarities between collections at the appropriate temporal and spatial scales or at least isolate the scales at which drawing such inferences is warranted.

Southern African culture-historic units and modern human dispersal(s)

The potential evolutionary relationships among southern African, eastern African, southwest as well as south and southeast Asian late Pleistocene assemblages have received substantial airing within the debate regarding modern human dispersal from Africa into Europe and Asia (Lahr and Foley, 1994; Foley and Lahr, 1997; Lahr and Foley, 1998; Petraglia et al., 2007; Mellars, 2005, 2006a, 2006b, Mellars et al., 2013). Dispersals from Africa towards and into southeast Asia are controversial in terms of (1) the potential geographic routes taken, (2) the number of separate population dispersals out of Africa, as well as (3) the timing of discrete dispersals. The artefact types and non-lithic cultural elements assumed to track this dispersal are inferred by some to have roots in the sub-Saharan African MSA, particularly in the Howiesons Poort and Still Bay complexes (Petraglia et al., 2007; Mellars, 2005, 2006a, 2006b, Mellars et al., 2013; however see Groucutt et al., 2015a, Lewis et al., 2014 for alternative views, and southern African-Asian comparisons based on MSA industries preceding the Still Bay and Howiesons Poort).

Prior to the genetic evidence for modern human dispersal routes, these routes were posited on the basis of stone artefact repertoires that behaviourally modern humans might have carried from Africa in two separate waves associated with two different technological systems. The geographic routes taken within these two dispersal events could be referred to as an initial "southern route" and a later "northern route" (Lahr and Foley, 1994; Foley and Lahr, 1997; Lahr and Foley, 1998). Within this initial hypothesis the northern route purportedly followed the Nile Valley and the Sinai Peninsula into southwest Asia and Europe, whereas the southern route maps a potentially earlier dispersal from eastern Africa. This took place across the mouth of the Red Sea – the Bab-el-Mandeb strait - and a subsequent eastward movement along the Yemeni, Iranian and Pakistani coastlines into southeast Asia and eventually Australia. The African source populations that dispersed via these distinct routes were inferred to be necessarily different in terms of their material cultures, based on the stark contrasts in the technologies associated with the sites that potentially mapped these separated routes (Lahr and Foley, 1994; Foley and Lahr, 1997; Lahr and Foley, 1998).

Genetic work associated with understanding modern human dispersals from Africa is on-going, and is frequently generating new information requiring the rethinking of models formulated exclusively on archaeological data. At the outset, genetic research does not seem to support the two wave dispersal model. The breadth of genetic diversity in modern day Asian and European populations is difficult to reconcile with a double or multiple out of Africa dispersal of modern humans (Kivisild et al., 2006; Forster, 2004; Forster and Matsumura, 2005; Macaulay et al., 2005; Behar et al., 2012; Wei, 2013).The logic here is that given all of the genetic diversity currently existing in Africa, more than one single prehistoric migration from Africa would have inflated the diversity outside of Africa to greater levels than is observed in modern European and Asian populations today. In summary, the central genetic evidence supporting a single later dispersal from Africa comprises three broad lines of evidence. These are (1) an 80-60ka modern human population size peak within Africa (Harpending et al., 1993; Harpending and Rogers, 2000; Sherry et al., 1994), (2) a potentially correlated subsequent 60-40ka size peak in Asian and European populations, and further the fact that (3) the whole of modern Asian and European populations derive from a single mitochondrial lineage which had its genetic roots in Africa (Kivisild et al., 2006; Forster, 2004; Forster and Matsumura, 2005; Macaulay, 2005; Soares et al., 2012; Shi et al., 2010; Fernandes et al., 2012; Behar et al., 2012; Wei, 2013). However, in contrast, whole-genome evidence has rather provided support for multiple, potentially earlier dispersals of *H. sapiens*-from-Africa models (Scally and Durbin, 2012; Groucutt et al., 2015b). Cumulatively, these findings broadly reflect that further evidence is needed to clarify which models of dispersal from Africa are unanimously supported by the different forms of genetic data.

The predictions of a multiple dispersal scenario were also tested rigorously against predictions for a single dispersal model by using simulations and genomic data from African, European and southeast Asian populations (Wollstein et al., 2010). Wollstein and colleagues study provided the strongest support for the single dispersal model. In short, the simulations are suggestive of a single population expansion and a subsequent divergence from one of the four mitochondrial lineages that existed in Africa, which later diverged outside of Africa once the source population of modern humans had already dispersed. Viewed cumulatively these data seem to provide an independent indicator of the population dynamics associated with the Africa to Asia single episode of early modern human dispersal.

In terms of geographic routes, the 'southern route' of modern humans dispersing to southeast Asia has become relatively widely favoured in archaeological circles, based on theoretical grounds that humans could have relied during this dispersal on the availability of coastal aquatic resources which were potentially relatively abundant along the southern route (Stringer, 2000; Bailey et al., 2007; O'Connell and Allen, 2012). In short, this argument suggests that in unfamiliar territory, environments hugging the coast provided a more conducive route, more predictable in terms of resource availability than what was to be found further inland. In theory this level of resource endowment on coasts would have required only minimal modifications to technological repertoires carried by dispersing groups in unfamiliar terrain. In turn, in a perhaps mildly circular way, this conjecture supports the tracing of modern human groups by identifying the expected similarities in archaeological assemblages to be found along this southern coastal route.

The focus of present research has shifted towards the timing or ages of the single dispersal along the southern route. To recap, this route initiates from southern to eastern Africa, and then traverses the Arabian peninsula along the coast, and then on to Sri-Lanka, India and Australia. Both 'earlier' (Petraglia et al., 2007, 2009, 2010; Haslam 2010a, 2010b; Clarkson, 2009; Blinkhorn and Petraglia, 2014; Groucutt and Petraglia, 2014) and 'later' (Mellars, 2006; Mellars et al., 2013; Underhill and Kivisild, 2007; Fernandes et al., 2012) southern migrations have been proposed. Given much of the genetic evidence derived from modern populations discussed above, these models are likely to be mutually exclusive. However, an alternative perspective based on genome wide interpretations of potential ongoing gene flow between African and non-African ancestors during MIS 5, is consistent with multiple and earlier dispersal models, and contradicts interpretations of single late dispersal events based on mtDNA trees (Campbell and Tishkoff, 2010; Schiffels and Durbin, 2012; Groucutt et al., 2015a, 2015b).

Proponents of both hypotheses ('later' and 'earlier' dispersal models) have sought archaeological support for their positions based on comparisons between various aspects of the Late Pleistocene southeast Asian and the south and east African MSA records of cultural remains. In both versions, the "centre of origin of these technologies" is suggested to be within southern Africa (Mellars et al. SI, 2013: 9).

Proponents of the earlier dispersal look to draw comparisons between stone artefact core forms associated with the Howiesons Poort in South Africa, as well as purportedly equivalent assemblages in east Africa (e.g. Mumba Cave), with core forms produced in both pre-Toba and post-Toba (74ka) horizons at Jwalapuram in southern India. This model posits that modern humans were already present in India by at least 74ka and possibly even as early as ~125ka (Appenzeller, 2012). Briefly put, the argument is made that because behaviourally modern humans are widely accepted to be responsible for the Howiesons Poort techno-tradition in South Africa, similarities between South African HP core morphologies and those in the >74ka levels at Jwalapuram indicate that the same modern humans were responsible for the production of the Jwalapuram cores as well (Petraglia et al., 2007).

This argument for a common demographic underpinning of the proposed similarities in core forms is flawed crucially on a number of levels, and some of these flaws have been pointed out as such in the literature (e.g. see enumeration in Mellars et al., 2013). For example, the sample of Indian cores is extremely small (20 cores from below the ash and 10 cores from above it). Such a low sample size is inappropriate for any statistical comparisons, least of all multi-variate techniques that rely on many predictors wherein the inclusion or exclusion of individual cases influences the results substantially. Secondly, cores which end up in the archaeological record represent lithic forms that were no longer required, and additionally were potentially also discarded at various stages within their use-lives. This discard was likely influenced by multiple different contextual factors including differences in available raw-materials and differences in the kind and frequency of opportunities to use tools in different environments. The fact that the sample of cores from below the ash was largely of amorphous or polyhedral-like forms (60-70% of the specimens (Mellars et al., 2013:SI); but see Groucutt et al., 2015a for an alternative description of Jwalapurum core reduction strategies), is also suggestive that their inclusion in such a comparison may have been inappropriate. It is, therefore, hard to accept that one can draw any meaningful cultural inferences from the comparison of cores without an in-depth understanding of what the influence of these contextual or environmental factors on core forms may have been. Thirdly, in the discriminant analyses of core forms (Petraglia et al., 2007: Fig.3), the Howiesons Poort collections from South Africa cluster most closely with the assemblage from the >74ka pre-Toba collection from Jwalapuram. However, the accepted dates for the Howiesons Poort largely cluster around ~60-65ka (Jacobs et al., 2008). It therefore makes little sense that the

Howiesons Poort could constitute the source population for the dispersal of pre-Toba technological systems represented in the Jwalapuram collection.

Supporters of the earlier modern human dispersal propose a local southeast Asian origin for the development of backed piece and microlithic industries within the Sri Lankan and Indian Late Pleistocene (Clarkson et al., 2009; Petraglia et al., 2009; Lewis et al., 2014). In contrast, the proponents of the later dispersal model claim these southeast Asian industries to be introduced (as invasive cultural phenomena) into these regions and tie their cultural origins to the African Howiesons Poort (Mellars et al., 2006a; Mellars et al., 2013). For instance, the possibility of a convergent development of Upper Paleolithic like industries in Sri-Lanka and India has been referred to as an "impossible coincidence" by adherents of the later dispersal model (Mellars et al., 2005). Interestingly, there is a growing body of evidence that even at the geographic scale of southern Africa, instances of the Still Bay and Howiesons Poort complexes may have evolved as convergent phenomena at certain times and in certain contexts (see data in: Porraz et al., 2013a; 2013b; Tribolo, 2009; 2013; Conard et al., 2014; Archer et al., 2016).

Advocates of the later dispersal have relied on a combination of archaeological and genetic evidence to make an argument for a ~60ka dispersal of modern humans from Africa, who are suggested to have spread along the southern route to arrive in southeast Asia and Australia by ~45-50ka (Mellars et al., 2013). The technological repertoire purported to be representative of the group dispersing at this time – being traceable back to eastern Africa and, in its origin, southern Africa - is slightly more complex than the 'core forms' relied on by supporters of the early dispersal model. The cultural repertoire of the later dispersal is associated at source with 'Howiesons Poort' and 'Howiesons Poort-like' sites in Africa.

However, bifacial 'leaf-shaped' points occurring in low numbers in the Sri-Lankan sites are suggested also to signify an association with African MSA bifacial point industries (Mellars et al. SI, 2013: 14). The engraved ochre from the Still Bay levels at Blombos – specifically the cross-hatched motif which is also evident on decorated ostrich egg-shell from Diepkloof (Texier et al., 2010; 2013) - along with backed pieces, laminar production techniques, shaped bone tools, bead forms, and engraved ostrich egg-shell motifs at other African sites comprise the array of proposed cultural features. These are inferred to be associated with the population responsible for the potential later dispersal. It is important to note that only one of these features – HP backed pieces - is present across all of the sites in Africa and southeast Asia that are suggested to be relevant to this debate (Mellars, 2006a; Mellars et al., 2013). Interestingly, comparisons between backed piece-industries from two Howiesons Poort sites within southern Africa, and comparisons between patterns in these two African sites and backed piece industries in Sri-Lanka have demonstrated substantial variation in the backed pieces themselves within all these collections, and the debitage and core-reduction components associated with these tool types (Lewis et al., 2014). Further, broad reviews of Middle Stone Age industries preceding the Still Bay in Africa have identified similarities with Middle Paleolithic assemblages across Asia. These similarities are purportedly more numerous than similarities between Still Bay and Howiesons Poort industries and techno-complexes outside of Africa (Groucutt et al., 2015a).

The general ages for the SB and HP in southern Africa (HP:~65-59ka, SB:~75-71ka: Jacobs et al., 2008a; 2015) dovetail neatly with the widely held inference that these techno-traditions share a range of cultural similarities with the slightly later localities of the MSA sites of Mumba and the Naisiusiu Beds (Olduvai) in Tanzania, the site of Enkapune-ya-Muto in Kenya and the Late-Pleistocene assemblages found at the yet later sites of Batadomba-lena and Fahien-lena in Sri Lanka and Jwalapuram, as well as Patne in India (Deraniyagala, 1992; Ambrose, 1998; Clarkson et al., 2009; Perera et al., 2011; Gliganic et al., 2012; Mellars, 2006a; 2006b; Mellars et al., 2013). The occurrence of backed pieces in particular at all of these sites "…analogous to the African Howiesons Poort…" in addition to the presence of intentionally carved cross-hatchings on ochre and ostrich egg-shell, are suggested to represent instances of a single modern human group at a trans-continental scale (Mellars, 2006a; Mellars et al., 2013: 10699). Features of the SB and HP were also suggested to be expressed in a range of other sites that are less reliably dated in Kenya and Ethiopia (Anthony, 1972; Wendorf and Schild, 1974). However, SB and HP sites occur at much higher density in southern Africa than in eastern Africa (Henshilwood, 2012; Henshilwood and Dubreuil, 2011).

Identifying similarities in the features of the SB and HP within assemblages found in the non-African material record is not a new endeavour and echoes the issues of comparison that researchers grappled with in earlier research phases in Africa (Goodwin, 1929; 1958; Gabel, 1985(for a review)). However, the assumption regarding the source location for the development of these traditions, and the contingent direction of diffusion or dispersal – in going from Africa to Europe and southeast Asia as identified today (e.g. Mellars et al., 2013) - is of course the reverse of what was inferred within the Eurocentric views characterising the early 20th century (Heese, 1933; van Hoepen, 1926).

Selective genetic and archaeological evidence when taken together enabled the formulation of a hypothesis, which will be referred to here as the 'later southern dispersal model' (Mellars et al., 2013). Within this model Mellars and colleagues compare modern human occupations at huge geographical scales (>3000 km in the case of linking southeast Asia to Africa) to track directionality in cultural transmissions as proxy measures for the movement of people and to identify African regions of origin. Yet there are alternative avenues of research that have rendered the genetic support for the classic formulation of the later southern dispersal model more complex. For example, evidence from the Neanderthal genome sequence suggests that all non-Africans, including southeast Asians, carry the signature in their genomes of a small genetic contribution from Neanderthals, between 1-4% (Green et al., 2010). What this suggests, potentially, is that a single initial population of dispersing modern humans from Africa first interbred with Neanderthals before migrating along the southern route to southeast Asia, whenever it may have been that this dispersal actually took place. Interestingly, within the classic formulation of the southern dispersal route, Neanderthals do not exist – or have not yet been identified - in the territory that modern humans would have had to traverse directly to get to southeast Asia, in particular the Arabian peninsula and the Sri Lankan and Indian coasts.

Undoubtedly there are aspects of labelled techno-traditions ("units") that are fundamentally cultural in character. This is perhaps evidenced in non-lithic cultural remains such as common ostrich egg-shell engraving motifs at different sites which are attributed to the HP tradition of the southern Cape region of South Africa, which recur through time (Texier et al., 2010; 2013) and perhaps are also widespread geographically (Henshilwood et al., 2014). However, certain key features of the HP and SB also emerge in chronological contexts within which it is highly unlikely that they relate in their origins to a process of common descent from a single Middle Stone Age origin.

For instance, numerous backed geometric lithics in isolated Mid-Holocene and terminal Late Pleistocene contexts, specific ostrich egg-shell engraving motifs that are known to appear in both Howiesons Poort, and modern hunter-gatherer decorative traditions are examples of such features. In southern Africa, backed pieces were produced in low numbers within a terminal Pleistocene techno-tradition known as the "Robberg", as well as more systematically within the Mid-Holocene "Wilton" complex. The very earliest known dates for the Robberg are around ~ 20-18ka (Parkington 1990; 1992; Deacon, 1995; Mackay et al., 2015) and this tradition persists in certain parts of southern Africa potentially as late as the start of the Holocene (Mitchell, 1995; 2002). The "Wilton" is a Holocene microlithic complex, and large numbers of backed pieces are associated with Wilton assemblages in addition to an array of other formal tools and a variety of organic artefact types (J. Deacon, 1984). The Wilton is an exclusively Holocene techno-tradition. A small number of identified Wilton sites in the northern region of southern Africa (Namibia, Zimbabwe) date to pre-8ka Holocene layers. However, their Wilton attribution and the reliability and precision of the radiocarbon dating of these sites remain unconfirmed by today's standards (Cooke 1979; Wendt 1976). Further south, Wilton sites occur exclusively within the 7-2ka Holocene interval (J. Deacon, 1972; Sampson, 1974). Backed pieces in the Robberg tend to be made exclusively on bladelette blanks, whereas backed pieces in the Wilton are typically produced on flakes, probably due to the lack of laminar blank production in Wilton industries generally and to the abundance of laminar production that is associated with the Robberg tradition.

If there was a continuous archaeological record of backed piece production from the Howiesons Poort through to the Robberg and then the Wilton, one might expect some kind of common descent or cultural transmission of backed piece production between these techno-traditions. However, in the time span separating the Howiesons Poort and the Robberg complexes (~40ky), and between the Robberg and Wilton complexes, there is no evidence for backed pieces in the southern African archaeological record. This is so despite numerous existing sites documenting the material cultures of the groups who lived during this intervening period.

In the 1960s and 1970s, prior to the availability of trapped charge dating, researchers assumed that the origin of Later Stone Age backed pieces was indeed within the Howiesons Poort tradition, yet it was also presumed then that the Howiesons Poort was 20ky old (Sampson, 1974). Another possibility is that Howiesons Poort groups existed after 59ka continuously somewhere else in Africa and that backed pieces were reintroduced in the south as acquired or introduced phenomena in the Holocene. However the dating of backed piece industries at sites in countries spanning the breadth of the sub-Saharan continent does not support this possibility. For example, the various backed piece industries known from sites associated with the “Tshitolian” of Angola, the Zimbabwean “Matopan” and “Pfupian”, the Zambian “Nachikufan” and “Zambian Wilton” as well as the Malawian “Nachikufan” all have Holocene ages. In other words, we have no idea what factors drive the production and spread of backed geometric pieces in the Late Pleistocene and Holocene records, which calls into question their broader use as techno-traditional markers.

Ostrich egg-shell container engraving motifs may be another example of convergence in cultural traits traditionally associated with southern African MSA techno-traditions. Both Holocene foragers and modern hunter-gatherers engraved ostrich egg-shell water containers, using a variety of different decorative motifs. These motifs are seen in both Howiesons Poort contexts as well as in Holocene and modern hunter gatherer contexts. For example the “crosshatched grid motif”, the “hatched band motifs with orthogonal lines” as well as the “hatched band motif with oblique lines” were identified as discrete decorative entities on numerous specimens from the Howiesons Poort levels at Diepkloof Rockshelter (Texier et al., 2010; 2013). These same motifs were deployed in later Holocene occupations, as well as by modern forager groups in Southern Africa (e.g. see motifs described in Luschan, 1923; Jacobson, 2006; Lange 2006; Rudner 1953; 1971). A reasonable inference is that the range of decorative motifs seen in Howiesons Poort and later ostrich egg-shell engraving contexts is a partial consequence of the range of motifs that are possible to engrave and the ease with which they can be engraved, given the type and morphology of the materials available.

These features – specific ostrich egg-shell incising motifs and backed piece production occurring discretely in both HP and Holocene contexts – is potentially suggestive of convergence. As a contingent matter, this may suggest that these are weak material proxies for tracing demographic groups across large expanses of space and time. Viewed spatially, establishing which material components of the HP and SB are signifiers for specific demographic groups at local geographic scales, is critical to the use of their defining features for drawing demographic inferences at a scale that is continental or even trans-continental (e.g. Mellars 2006a; Mellars et al., 2013).

Furthermore, as discussed in previous chapters, Still Bay points, the *fossile directeur* of the Still Bay techno tradition, are asserted to be present in Kwa-Zulu Natal (the "north-east"), >1000 km away from the sites in which this techno tradition was initially defined at sites like Blombos and Hollow Rock Shelter in the southern and eastern Cape (the "south west"). Even when one controls for or minimizes ecological influences on bifacial point form, the point shapes produced in the northeast are significantly different from those produced within the sites in the southwest. This seems to suggest that even at the scale of the sub-continent of southern Africa, bifacial point technologies in MIS5a and early MIS4 contexts do not seem to be components of a culturally homogenous entity across space, reflecting contacts and synchronic transmission between cultural groups.

If there are potentially recurrent episodes of convergence at the local scale of southern Africa, why would one expect it to be an "impossible coincidence" at the global scale (Mellars, 2005)? It is unavoidable that some aspects of forager material culture were convergent in their nature; there are numerous examples of this in archaeological records ranging from the Acheulean in Europe and Africa right through to modern hunter-gatherer material cultures. The critical endeavour in using material remains to track and identify demographic groups in the archaeological record – albeit at the scale of southern Africa, Africa or the world - is to isolate the elements of material culture that are demonstrably traceable through processes of branching (descent and dispersal) or blending (cultural diffusion) and, crucially, are not potentially explained by convergence.

References

Ambrose, S. H. (1998). Chronology of the Later Stone Age and food production in East Africa. *Journal of archaeological science*, *25*(4), 377-392.

Anthony, B. W. (1972). The Stillbay question. Actes du VIe Congre`s panafricain de pre´histoire, Dakar, 1967(6), 80–82.

Appenzeller, T. (2012). Human migrations: Eastern odyssey. *Nature*, *485*(7396), 24-26.

Archer, W., Gunz, P., van Niekerk, K. L., Henshilwood, C. S., & McPherron, S. P. (2015). Diachronic change within the still Bay at Blombos cave, South Africa. *PloS one*, *10*(7), e0132428.

Archer, W., Pop, C.M., Gunz, P., McPherron, S.P. (2016): What is Still Bay? Human biogeography and bifacial point variability. *Journal of Human Evolution*.

Bailey, G. N., Flemming, N. C., King, G. C., Lambeck, K., Momber, G., Moran, L. J., ... & Vita-Finzi, C. (2007). Coastlines, submerged landscapes, and human evolution: the Red Sea Basin and the Farasan Islands. *The Journal of Island and Coastal Archaeology*, *2*(2), 127-160.

Binford, L. R. (2001). *Constructing frames of reference: an analytical method for archaeological theory building using hunter-gatherer and environmental data sets*. University of California Press.

Bleed, P. (1997). Content as variability, result as selection: Toward a behavioral definition of technology. *Archeological Papers of the American Anthropological Association*, *7*(1), 95-104.

Blinkhorn, J., & Petraglia, M. D. (2014). Assessing models for the dispersal of modern humans to South Asia. In *Southern Asia, Australia and the Search for Human Origins* (pp. 64-75). Cambridge University Press Cambridge.

Bousman, C. B. (1993). Hunter-gatherer adaptations, economic risk and tool design. *Lithic Technology*, 59-86.

Campbell, M. C., & Tishkoff, S. A. (2010). The evolution of human genetic and phenotypic variation in Africa. *Current biology*, *20*(4), R166-R173.

Clarkson, C., Petraglia, M., Korisettar, R., Haslam, M., Boivin, N., Crowther, A., & Connell, K. (2009). The oldest and longest enduring microlithic sequence in India: 35 000 years of modern human occupation and change at the Jwalapuram Locality 9 rockshelter. *Antiquity*, *83*(320), 326-348.

Conard, N. J., Bader, G. D., Schmid, V. C., & Will, M. (2014). Bringing the Middle Stone Age into Clearer Focus. *Mitteilungen der Gesellschaft für Urgeschichte*, *23*, 121.

Cooke, C. K. (1979). *Excavations at Diana's Vow Rock Shelter, Makoni District, Zimbabwe, Rhodesia*. National Museums and Monuments.

Clarkson, C., Petraglia, M., Korisettar, R., Haslam, M., Boivin, N., Crowther, A.,& Connell, K. (2009). The oldest and longest enduring microlithic sequence in India: 35 000 years of modern human occupation and change at the Jwalapuram Locality 9 rockshelter. *Antiquity*, *83*(320), 326-348.

Deraniyagala, S. U. (1992). *The prehistory of Sri Lanka: an ecological perspective* (Vol. 2). Department of archaeological survey, government of Sri Lanka.

Deacon, H. J. (1995). Two late Pleistocene-Holocene archaeological depositories from the southern Cape, South Africa. *The South African Archaeological Bulletin*, 121-131.
Deacon, J. (1972). Wilton: an assessment after fifty years. *The South African Archaeological Bulletin*, *27*(105/106), 10-48.

Deacon, J. (1984). *The Later Stone Age of southernmost Africa* (Vol. 213). Oxford: BAR.

Dibble, H. L. (1987). The interpretation of Middle Paleolithic scraper morphology. *American antiquity*, 109-117.

Discamps, E., & Henshilwood, C. S. (2015). Intra-Site Variability in the Still Bay Fauna at Blombos Cave: Implications for Explanatory Models of the Middle Stone Age Cultural and Technological Evolution. *PloS one*, *10*(12), e0144866.

Feathers, J. (2015). Luminescence dating at Diepkloof Rock Shelter–new dates from single-grain quartz. *Journal of Archaeological Science*, *63*, 164-174.

Fernandes, V., Alshamali, F., Alves, M., Costa, M. D., Pereira, J. B., Silva, N. M., ... & Richards, M. B. (2012). The Arabian cradle: mitochondrial relicts of the first steps along the southern route out of Africa. *The American Journal of Human Genetics*, *90*(2), 347-355.

Foley, R., & Lahr, M. M. (1997). Mode 3 technologies and the evolution of modern humans. *Cambridge Archaeological Journal*, *7*(01), 3-36.

Forster, P. (2004). Ice Ages and the mitochondrial DNA chronology of human dispersals: a review. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, *359*(1442), 255-264.

Forster, P., & Matsumura, S. (2005). Did early humans go north or south?. *Science*, *308*(5724), 965-966.

Gabel, C. (1985). Archaeology in Sub-Saharan Africa, 1800-1960. *The International Journal of African Historical Studies*, *18*(2), 241-264.

Gliganic, L. A., Jacobs, Z., Roberts, R. G., Domínguez-Rodrigo, M., & Mabulla, A. Z. (2012). New ages for Middle and Later Stone Age deposits at Mumba rockshelter, Tanzania: Optically stimulated luminescence dating of quartz and feldspar grains. *Journal of Human Evolution*, *62*(4), 533-547.

Goodwin, A. J. H., & Lowe, C. V. R. (1929). *The stone age cultures of South Africa*. Trustees of the South African Museum.

Goodwin, A. J. H. (1958). Formative years of our prehistoric terminology. *The South African Archaeological Bulletin*, *13*(49), 25-33.

Green, R. E., Krause, J., Briggs, A. W., Maricic, T., Stenzel, U., Kircher, M., ... & Hansen, N. F. (2010). A draft sequence of the Neandertal genome. *science*, *328*(5979), 710-722.

Groucutt, H. S., Scerri, E. M., Lewis, L., Clark-Balzan, L., Blinkhorn, J., Jennings, R. P. & Petraglia, M. D. (2015a). Stone tool assemblages and models for the dispersal of Homo sapiens out of Africa. *Quaternary International*, *382*, 8-30.

Groucutt, H. S., Petraglia, M. D., Bailey, G., Scerri, E. M., Parton, A., Clark-Balzan, L. & Breeze, P. S. (2015b). Rethinking the dispersal of Homo sapiens out of Africa. *Evolutionary Anthropology: Issues, News, and Reviews*, *24*(4), 149-164.

Groucutt, H. S., & Petraglia, M. D. (2014). An Arabian perspective on the dispersal of Homo sapiens out of Africa. *Southern Asia, Australia and the Search for Human Origins. Cambridge University Press, Cambridge*, 5.

Grün, R., Stringer, C., McDermott, F., Nathan, R., Porat, N., Robertson, S., ... & McCulloch, M. (2005). U-series and ESR analyses of bones and teeth relating to the human burials from Skhul. *Journal of Human Evolution*, *49*(3), 316-334.

Guérin, G., Murray, A.S., Jain, M., Thomsen, K.J., Mercier, N. (2013). How confident are we in the chronology of the transition between Howieson's Poort and Still Bay? *Journal of Human Evolution*. 64, 314–317.

Harpending, H. C., Sherry, S. T., Rogers, A. R., & Stoneking, M. (1993). The genetic structure of ancient human populations. *Current Anthropology*, *34*(4), 483-496.
Harpending, H., & Rogers, A. (2000). Genetic perspectives on human origins and differentiation. *Annual review of genomics and human genetics*, *1*(1), 361-385.

Haslam, M., Clarkson, C., Petraglia, M., Korisettar, R., Jones, S., Shipton, C & Ambrose, S. H. (2010a). The 74 ka Toba super-eruption and southern Indian hominins: archaeology, lithic technology and environments at Jwalapuram Locality 3. *Journal of Archaeological Science*, *37*(12), 3370-3384.

Haslam, M., Clarkson, C., Petraglia, M., Korisettar, R., Bora, J., Boivin, N., & Mackay, A. (2010b). Indian lithic technology prior to the 74,000 BP Toba super-eruption: searching for an early modern human signature. *The Upper Palaeolithic Revolution in Global Perspective: Essays in Honour of Paul Mellars. McDonald Institute for Archaeological Research, Cambridge*, 73-84.

Hayden, B. (1977). Stone tool functions in the Western Desert. In *Stone tools as cultural markers: change, evolution and complexity* (Vol. 12, pp. 178-188).

Heese, C. H. T. D. (1933). The evolution of Palaeolithic technique. Annals of the University of Stellenbosch. 11(2), 1–65.

Henshilwood, C. S. (2012). Late Pleistocene techno-traditions in southern Africa: A review of the Still Bay and Howiesons Poort, c. 75–59 ka. *Journal of World Prehistory*, *25*(3-4), 205-237.

Henshilwood, C. S., & Dubreuil, B. (2011). The Still Bay and Howiesons Poort, 77–59 ka. *Current Anthropology*, *52*(3), 361-400.

Henshilwood, C. S., van Niekerk, K. L., Wurz, S., Delagnes, A., Armitage, S. J., Rifkin, R. F., ... & Discamps, E. (2014). Klipdrift shelter, southern Cape, South Africa: preliminary report on the Howiesons Poort layers. *Journal of Archaeological Science*, *45*, 284-303.

Högberg, A., Larsson, L. (2011). Lithic technology and behavioural modernity: new results from the Still Bay site, Hollow Rock Shelter, Western Cape Province, South Africa. *Journal of Human Evolution*. *61*, 133–55.

Isaac, G., & Isaac, B. (1989). *The archaeology of human origins: papers by Glynn Isaac*. Cambridge University Press.

Jacobs, Z., & Roberts, R. G. (2008). Testing times: old and new chronologies for the Howieson's Poort and Still Bay industries in environmental context. *Goodwin Series*, 9-34.

Jacobs, Z., Roberts, R.G., Galbraith, R.F., Deacon, H.J., Grün, R., Mackay, A., Mitchell, P., Vogelsang, R., Wadley, L. (2008b). Ages for the Middle Stone Age of Southern Africa: Implications for Human Behavior and Dispersal. *Science*. *322*, 733–735.

Jacobs, Z., & Roberts, R. G. (2009). Catalysts for Stone Age innovations: what might have triggered two short-lived bursts of technological and behavioral innovation in southern Africa during the Middle Stone Age?. *Communicative & integrative biology*, *2*(2), 191-193.

Jacobs, Z., & Roberts, R. G. (2015). An improved single grain OSL chronology for the sedimentary deposits from Diepkloof Rockshelter, Western Cape, South Africa. *Journal of Archaeological Science*, *63*, 175-192.

Jacobson, L. (2006) Namibian Decorated Ostrich Eggshells Rediscovered. *The Digging Stick*, 23 (2).

Kelly, R. L. (2013). *The lifeways of hunter-gatherers: The foraging spectrum*. Cambridge University Press.

Kivisild, T., Shen, P., Wall, D. P., Do, B., Sung, R., Davis, K.& Scozzari, R. (2006). The role of selection in the evolution of human mitochondrial genomes. *Genetics*, *172*(1), 373-387.

Kroeber, A. L. (1931). Historical reconstruction of culture growths and organic evolution. *American Anthropologist*, *33*(2), 149-156.

Lahr, M. M., & Foley, R. (1994). Multiple dispersals and modern human origins. *Evolutionary Anthropology: Issues, News, and Reviews*, *3*(2), 48-60.

Lahr, M. M., & Foley, R. A. (1998). Towards a theory of modern human origins: geography, demography, and diversity in recent human evolution. *Yearbook of physical anthropology*, *41*, 137-176.

Lange, M. E. (2006). Tracking decorated ostrich eggshells in the Kalahari. *Visual Anthropology*, *19*(3-4), 371-388.

Lewis, L., Perera, N., & Petraglia, M. (2014). First technological comparison of Southern African Howiesons Poort and South Asian Microlithic industries: An exploration of inter-regional variability in microlithic assemblages. *Quaternary International*, *350*, 7-25.

Liu, H., Prugnolle, F., Manica, A., & Balloux, F. (2006). A geographically explicit genetic model of worldwide human-settlement history. *The American Journal of Human Genetics*, *79*(2), 230-237.

Liu, W., Jin, C. Z., Zhang, Y. Q., Cai, Y. J., Xing, S., Wu, X. J., ... & An, Z. S. (2010). Human remains from Zhirendong, South China, and modern human emergence in East Asia. *Proceedings of the National Academy of Sciences*, *107*(45), 19201-19206.

Liu, W., Martinón-Torres, M., Cai, Y. J., Xing, S., Tong, H. W., Pei, S. W., ... & Li, Y. Y. (2015). The earliest unequivocally modern humans in southern China. *Nature*.

Lombard, M., Wadley, L., Jacobs, Z., Mohapi, M., & Roberts, R. G. (2010). Still Bay and serrated points from Umhlatuzana rock shelter, Kwazulu-Natal, south Africa. *Journal of Archaeological Science*, *37*(7), 1773-1784.

Lombard, M., Wadley, L., Deacon, J., Wurz, S., Parsons, I., Mohapi, M., ... & Mitchell, P. (2012). South African and Lesotho Stone Age sequence updated. *The South African Archaeological Bulletin*, *67*(195), 123-144.

Luschan, F. (1923). Buschmann-Einritzungen auf Straußeneiern. *Zeitschrift für Ethnologie*, *55*(H. 1/4), 31-40.

Lyman, R. L., O'Brien, M. J., & Dunnell, R. C. (1997). *The rise and fall of culture history*. Springer Science & Business Media.

Mackay, A., Stewart, B. A., & Chase, B. M. (2014). Coalescence and fragmentation in the late Pleistocene archaeology of southernmost Africa. *Journal of human evolution*, *72*, 26-51.

Mackay, A., Jacobs, Z., & Steele, T. E. (2015). Pleistocene archaeology and chronology of putslaagte 8 (PL8) rockshelter, western cape, South Africa.

Macaulay, V., Hill, C., Achilli, A., Rengo, C., Clarke, D., Meehan, W., ... & Taha, A. (2005). Single, rapid coastal settlement of Asia revealed by analysis of complete mitochondrial genomes. *Science*, *308*(5724), 1034-1036.

Mellars, P. (2005). The impossible coincidence. A single-species model for the origins of modern human behavior in Europe. *Evolutionary Anthropology: Issues, News, and Reviews*, *14*(1), 12-27.

Mellars, P. (2006a). Why did modern human populations disperse from Africa ca. 60,000 years ago? A new model. *Proceedings of the National Academy of Sciences*, *103*(25), 9381-9386.

Mellars, P. (2006b). Going east: new genetic and archaeological perspectives on the modern human colonization of Eurasia. *Science*, *313*(5788), 796-800.

Mellars, P., Gori, K. C., Carr, M., Soares, P. A., & Richards, M. B. (2013). Genetic and archaeological perspectives on the initial modern human colonization of southern Asia. *Proceedings of the National Academy of Sciences*, *110*(26), 10699-10704.

Murray-Wallace, C. V., Richter, J., & Vogelsang, R. (2015). Aminostratigraphy and taphonomy of ostrich eggshell in the sedimentary infill of Apollo 11 Rockshelter, Namibia. *Journal of Archaeological Science: Reports*, *4*, 143-151.

Parkington, J. E. (1990). A view from the south: southern Africa before, during, and after the Last Glacial Maximum. *The world at*, *18*(000), 214-228.

Parkington, J. E. (1992). Making sense of sequence at the Elands Bay cave, western Cape, South Africa. *Guide to archaeological sites in the south-western Cape*, *6*, 12.

Palanichamy, M., Sun, C., Agrawal, S., Bandelt, H. J., Kong, Q. P., Khan, F., ... & Zhang, Y. P. (2004). Phylogeny of mitochondrial DNA macrohaplogroup N in India, based on complete sequencing: implications for the peopling of South Asia. *The American Journal of Human Genetics*, *75*(6), 966-978.

Pakendorf, B., & Stoneking, M. (2005). Mitochondrial DNA and human evolution. *Annu. Rev. Genomics Hum. Genet.*, *6*, 165-183.

Perera, N., Kourampas, N., Simpson, I. A., Deraniyagala, S. U., Bulbeck, D., Kamminga, J., ... & Oliveira, N. V. (2011). People of the ancient rainforest: Late Pleistocene foragers at the Batadomba-lena rockshelter, Sri Lanka. *Journal of human evolution*, *61*(3), 254-269.

Petraglia, M., Korisettar, R., Boivin, N., Clarkson, C., Ditchfield, P., Jones, S., ... & Roberts, R. (2007). Middle Paleolithic assemblages from the Indian subcontinent before and after the Toba super-eruption. *Science*, *317*(5834), 114-116.

Petraglia, M., Clarkson, C., Boivin, N., Haslam, M., Korisettar, R., Chaubey, G., ... & Kivisild, T. (2009). Population increase and environmental deterioration correspond with microlithic innovations in South Asia ca. 35,000 years ago. *Proceedings of the National Academy of Sciences*, *106*(30), 12261-12266.

Petraglia, M. D., Haslam, M., Fuller, D. Q., Boivin, N., & Clarkson, C. (2010). Out of Africa: new hypotheses and evidence for the dispersal of Homo sapiens along the Indian Ocean rim. *Annals of human biology*, *37*(3), 288-311.

Porraz, G., Parkington, J.E., Rigaud, J.-P., Miller, C.E., Poggenpoel, C., Tribolo, C., Archer, W., Cartwright, C.R., Charrié-Duhaut, A., Dayet, L., Igreja, M., Mercier, N., Schmidt, P., Verna, C., Texier, P.-J. (2013a). The MSA sequence of Diepkloof and the history of southern African Late Pleistocene populations. *Journal of Archaeological Science*. *40*, 3542–3552.

Porraz, G., Texier, P. J., Archer, W., Piboule, M., Rigaud, J. P., & Tribolo, C. (2013b). Technological successions in the Middle Stone Age sequence of Diepkloof Rock Shelter, Western Cape, South Africa. *Journal of Archaeological Science*, *40*(9), 3376-3400.

Rudner, I. (1953). Decorated ostrich egg-shell and stone implements from the Upington area. *The South African Archaeological Bulletin*, *8*(31), 82-84.

Rudner, J. (1971). Ostrich egg-shell flasks and soapstone objects from the Gordonia District, north-western Cape. *The South African Archaeological Bulletin*, *26*(103/104), 139-142.

Sampson, C. G. (1974). *The stone age archaeology of Southern Africa*. Academic Press Inc.

Scally, A., & Durbin, R. (2012). Revising the human mutation rate: implications for understanding human evolution. *Nature Reviews Genetics*, *13*(10), 745-753.

Schiffels, S., & Durbin, R. (2014). Inferring human population size and separation history from multiple genome sequences. *Nature genetics*, *46*(8), 919-925.

Sherry, S. T., Rogers, A. R., Harpending, H., Soodyall, H., Jenkins, T., & Stoneking, M. (1994). Mismatch distributions of mtDNA reveal recent human population expansions. *Human Biology*, 761-775.

Shi, W., Ayub, Q., Vermeulen, M., Shao, R. G., Zuniga, S., van der Gaag, K., ... & Tyler-Smith, C. (2010). A worldwide survey of human male demographic history based on Y-SNP and Y-STR data from the HGDP–CEPH populations. *Molecular biology and evolution*, *27*(2), 385-393.

Shott, M.J. (2005). The reduction thesis and its discontents: Review of Australian approaches. In: Clarkson, C., Lamb, L. (Eds.), Lithics "Down Under": Australian Perspectives on Lithic Reduction, Use and Classification. British Archaeological Reports International Monograph Series 1408,Archaeopress, Oxford, pp. 109–125.

Shott, M.J. (2007). Recent advances in stone-tool reduction analysis: A review for Brazilian archaeologists. In: Bueno, L., Isnardis, A. (Eds.), Das Pedras Aos Homens: Tecnologia Lítica Na Arqueologia Brasileira. Argumentum Editora, Belo Horizonte, Minas Gerais, pp. 243–267.

Shott, M. J., & Ballenger, J. A. (2007). Biface reduction and the measurement of dalton curation: a southeastern United States case study. *American Antiquity*, 153-175.

Stoneking, M., & Harvati, K. (2013). 4 Early Old World migrations of Homo sapiens: human biology. *The Encyclopedia of Global Human Migration*.

Texier, P. J., Porraz, G., Parkington, J., Rigaud, J. P., Poggenpoel, C., Miller, C., ... & Steele, T. (2010). A Howiesons Poort tradition of engraving ostrich eggshell containers dated to 60,000 years ago at Diepkloof Rock Shelter, South Africa. *Proceedings of the National Academy of Sciences*, *107*(14), 6180-6185.

Texier, P. J., Porraz, G., Parkington, J., Rigaud, J. P., Poggenpoel, C., & Tribolo, C. (2013). The context, form and significance of the MSA engraved ostrich eggshell collection from Diepkloof Rock Shelter, Western Cape, South Africa. *Journal of Archaeological Science*, *40*(9), 3412-3431.

Torrence, R. (1989). *Time, energy and stone tools*. Cambridge University Press.

Torroni, A., Achilli, A., Macaulay, V., Richards, M., & Bandelt, H. J. (2006). Harvesting the fruit of the human mtDNA tree. *TRENDS in Genetics*, *22*(6), 339-345.

Tribolo, C., Mercier, N., Valladas, H., Joron, J. L., Guibert, P., Lefrais, Y. & Poggenpoel, C. (2009). Thermoluminescence dating of a Stillbay–Howiesons Poort sequence at Diepkloof Rock Shelter (Western Cape, South Africa). *Journal of Archaeological Science*, *36*(3), 730-739.

Tribolo, C., Mercier, N., Douville, E., Joron, J. L., Reyss, J. L., Rufer, D., ... & Parkington, J. (2013). OSL and TL dating of the Middle Stone Age sequence at Diepkloof Rock Shelter (South Africa): a clarification. *Journal of Archaeological Science*, *40*(9), 3401-3411.

Underhill, P. A., & Kivisild, T. (2007). Use of Y chromosome and mitochondrial DNA population structure in tracing human migrations. *Annu. Rev. Genet.*, *41*, 539-564.

Van Hoepen, E. C. N. (1926). Die indeling en relatiewe ouderdom van die Suid-Afrikaanse klipwerktuie. *S. Afr. J. Sci*, *23*, 793-809.

Vanhaeren, M., d'Errico, F., van Niekerk, K. L., Henshilwood, C. S., & Erasmus, R. M. (2013). Thinking strings: additional evidence for personal ornament use in the Middle Stone Age at Blombos Cave, South Africa. *Journal of human evolution*, *64*(6), 500-517.

Wadley, L., & Harper, P. (1989). Rose Cottage Cave revisited: Malan's Middle Stone Age collection. *The South African Archaeological Bulletin*, 23-32.

Wadley, L., & Mohapi, M. (2008). A segment is not a monolith: evidence from the Howiesons Poort of Sibudu, South Africa. *Journal of Archaeological Science*, *35*(9), 2594-2605.

Wendorf, F., & Schild, R. (1974). *A Middle Stone Age Sequence from the Central Rift Valley, Ethiopia*. Zakład Narodowy im. Ossolińskich.

Wendt, W. E. (1976). 'Art Mobilier'from the Apollo 11 Cave, South West Africa: Africa's Oldest Dated Works of Art. *The South African Archaeological Bulletin*, 5-11.

Wollstein, A., Lao, O., Becker, C., Brauer, S., Trent, R. J., Nürnberg, P., ... & Kayser, M. (2010). Demographic history of Oceania inferred from genome-wide data. *Current Biology*, *20*(22), 1983-1992.