C H A P T E R O N E

(Thesis pages 1-14)

INTRODUCTION: MACRO-PERSPECTIVE ON MICRO-MANIA

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1.1 Rationale for use-trace research on Middle Stone Age tools

For most of our existence as humans we lived by hunting and gathering (Kuhn & Stiner 2001: 99). In the reconstruction of the long, varied and multi-layered development of humans and human society the history of work processes and the development of human activities are of particular significance (Thieme 2005: 115). For most of the Stone Age we almost exclusively have to infer our knowledge of work processes from the durable tools made from lithic raw materials. The first time I looked down a microscope at the surface of a stone tool a new world presented itself, a world filled with colours, shapes, textures and patterns – some of which were the results of tool use. A world that, if I was able to unravel the use-trace patterns, would provide direct evidence for the actions of individuals and groups who lived thousands of years ago.

Use-trace analyses such as micro-residue analysis, usewear analysis and macrofracture analysis – and other analytical methods that focus on stone tool function – are increasingly being used to contribute data to site interpretation, past human behaviour and cognitive evolution. Relevant examples of the most recent contributions include work by Akerman *et al*. (2002), Anderson *et al*. (2004), Brooks *et al*. (2006), Fullagar with Jones (2004), Fullagar *et al*. (2006), Gibson *et al*. (2004), Grünberg (2002), Hardy (2004a, b), Hardy *et al*. (2001), Rots and van Peer (2006), Shea (1997, 2006), Wadley *et al*. (2004a), and Williamson (2004, 2005). New approaches to stone tool function and interpretative frameworks are built upon the foundations of previous use-trace research (e.g. Anderson 1980; Anderson-Gerfaud 1990; Bergman & Newcomer 1983; Brink 1978; Briuer 1976; Fischer *et al*. 1984; Fullagar 1988; Fullagar *et al*. 1996; Hayden 1979; Hurcombe 1992; Jahren *et al*. 1979; Kamminga 1980; Keeley 1982; Knutsson 1988; Loy 1983; Loy & Dixon 1998; Odell 1981; Shea 1988a, 1989; Wadley & Binneman 1995; Williamson 1996). Replication, experimentation and blind testing have long traditions in use-trace research, and analysts are persistently refining such projects

and their analytical methods (Binneman & Deacon 1986; Fischer *et al*. 1984; Grace *et al*. 1985; Kay 1996; Keeley 1980; Keeley & Newcomer 1977; Lombard *et al*. 2004; Newcomer *et al*. 1986; Odell 1975; Odell & Cowan 1986; Odell & Odell-Vereecken 1980; Shea 1988b; Shea *et al*. 2001, 2002; Shea & Klenck 1993; Semenov 1964).

Methodological projects are now often designed to address distinct research questions, or they focus on specific use-trace elements, and exercises such as blind tests are increasingly planned as components of more extensive archaeological research programmes (e.g. Barton *et al*. 1998; Fullagar *et al*. 1998; Hardy & Garufi 1998; Haslam, 2004, 2006; Horrocks & Weisler in press; McBrearty *et al*. 1998; Pearsall *et al*. 2004; Piperno *et al*. 2004; Rots 2003, 2005; Rots *et al*. 2001; Rots *et al*. 2006; Rots & Williamson 2004; Shea *et al*. 2002; Wadley *et al*. 2004b). The focused methodological research aims to: a) isolate limitations within methods such as usewear or micro-residue analysis, b) find solutions for limitations and thereby improve methodology, c) highlight areas where caution is required during functional interpretations, and d) enhance the quality and accuracy of functional interpretations. Such problem driven research is increasing the confidence in the interpretation of stone tool functions and the technologies associated with stone tools, such as hafting. Subsistence, behavioural and evolutionary hypotheses posited around tool function benefit on the whole from these more confident and detailed interpretations.

It was therefore clear that the application and focused development of analytical methods such as micro-residue analysis, usewear analysis and macrofracture analysis would be invaluable for creating new data and interpretative frameworks for my long-term research interest in work processes such as hunting and hafting. Currently, I am particularly interested in the role that developments, variations and changes in hunting and hafting technologies played during the process of human behavioural modernisation. This thesis represents the evolution of this research interest, and aims to position it within the context of current Middle Stone Age research in southern Africa.

1.2 The Middle Stone Age in South Africa and modern human behaviour

During the past ten years there has been a marked increase in research interest in the African Middle Stone Age that spans the period of roughly 250 ka to 40 ka ago. This surge is due to new, multi-disciplinary data stimulating debate on the origins of anatomically and behaviourally modern humans, and while the archaeological record is nowhere near complete, progress is being made. Exciting, but hotly contested, results seem weighted against previous concepts of a Eurasian origin for modern humans (Marean & Assefa 2005: 114; but also see d'Errico 2003; d'Errico *et al*. 2003; Shea 2003). Genetic and fossil evidence suggest that humans were anatomically nearly modern in Africa by *c*. 160 ka ago. Fundamental questions are whether anatomical and behavioural modernity developed in tandem, and what criteria, if any, archaeologists should use to identify modern human behaviour (Henshilwood & d'Errico 2005; Henshilwood & Marean 2003, 2006; Kuhn & Hovers 2006; McBrearty & Brooks 2000; Shea 2003; Wadley 2001, 2006a). New results seem to suggest that cultural aspects of behavioural modernity in Africa extend far earlier than the 50 ka 'Rubicon' (Henshilwood & Marean 2003; Marean & Assefa 2005; McBrearty & Brooks 2000; Mellars 1973, 2005, 2006; Minichillo 2005; Wadley 2006a, b), and the Middle Stone Age of South Africa has claimed a central role in the quest for the origins of modern human behaviour.

For Henshilwood and Marean (2003, 2006) a partial cause for the disagreements in the literature is the absence of a coherent body of theory defining modern human behaviour and they appeal for agreement on a single definition for modern human behaviour. There has been a trend to use behavioural traits thought to be either modern or non-modern, and then to focus on the empirical archaeological record for determining the antiquity and distribution of those traits (e.g., Deacon 1995; Hayden 1993; McBrearty & Brooks 2000; Mellars 1995; Thackeray 1992). This resulted in checklists using material correlates of specific behaviours considered to be unique to, or indicative of, a modern human intellect or social behaviour (e.g., Gamble 1994; Klein 2000; McBrearty & Brooks 2000). The trait-list approach is considered problematic by some Middle Stone Age researchers

(e.g., Henshilwood & Marean 2003, 2006; Minichillo 2005, Wadley 2001; 2006a). The trait-list has its empirical roots in Eurasian Middle/Upper Palaeolithic archaeological data, and therefore might be less valuable in the African context. Several traits can be linked to technological developments, resource exploitation, labour intensification and climate forcing, which might have little or nothing to do with the origins of symbolic behaviour. For recent discussions of related issues, see Henshilwood and Marean (2006), Shea and Bar-Yosef (2005), and references in both. Henshilwood and Marean (2006) argue that modern humans are the only species to have fully symbolic behaviour that can be considered the root of a single suggested definition of modernity:

> ….behaviour that is mediated by socially constructed patterns of symbolic thinking, actions and communication that allow for material and information exchange and cultural continuity between and across generations and contemporaneous communities (Henshilwood & Marean 2006: 44).

Some consensus has been reached concerning material culture that represents external (out-of-brain) storage of information in the archaeological record, and therefore direct evidence for fully symbolic behaviour. These include artwork, personal ornamentation, lithic style and social use of space (Henshilwood & Marean 2003, 2006; Wadley 2001).

The theoretical shortfalls of the trait-list approach and the limited sources of material culture that could be considered direct evidence for fully symbolic behaviour during the Middle Stone Age create an impasse that seems difficult to overcome. One way of making headway is to broaden our knowledge of lifeways, technologies and environmental circumstances during the Middle Stone Age, using all possible avenues of enquiry (e.g. Wadley 2006a). Multidisciplinary and multi-stranded approaches have the potential to highlight the complex, variable and multi-faceted nature of the archaeological record. The collective results of such studies have the potential to provide substantially enhanced contexts within which social and cognitive reconstructions can be more securely grounded or modelled (Wylie 1989a). Within this context I highlight three key areas in Middle Stone Age research that might benefit from functional data derived from stone tools using use-trace analyses.

1.3 Key hypotheses and questions that might benefit from use-trace studies on Middle Stone Age tools

1.3.1 Hunting with Still Bay points and Howiesons Poort segments

The development of modern human behaviour is likely to have encompassed a vast and complex series of events that probably developed according to a mosaic-like pattern over time and space. Thus, the scale and repertoire of modern human behaviour could be enormous (Chase & Dibble 1990; Deacon 2001; Foley & Lahr 1997; Gibson 1996; McBrearty & Brooks 2000; Renfrew 1996). Neural reorganisation within the human brain over millennia, rather than as a punctuated event, might have led to periods of rapid innovation or stasis depending on selective criteria that favoured or disfavoured novelty and change (Henshilwood & d'Errico 2005). Henshilwood and d'Errico (2005: 248) argue that rapid changes in Middle Stone Age toolkits such as the Still Bay (at *c*. 84-72 ka) and Howiesons Poort (at *c*. 55-65 ka) might be indicators of accumulated advances in cognitive abilities that manifest in novelty. Behaviour leading to the introduction of innovative ideas such as symbolic artefacts, new subsistence skills – some of which could be represented by new types of hunting weapons – or the remodelling of space within a living site, might act as markers for the recognition of modern type behaviour at some sites (Henshilwood & d'Errico 2005).

From early on, effective hunting was considered an important indicator of behavioural modernity unique to the Upper Palaeolithic or Later Stone Age (Binford 1984, 1985; Klein 1974, 1980; Klein & Cruz-Uribe 1996; Klein & Edgar 2002). However, refinements in data collection and interpretation support a fully effective hunter model for some sites from the European Middle Palaeolithic and the African Middle Stone Age (Brooks *et al.* 2006; Chase 1989; Deacon 1985; Grayson & Delpech 1994; Lieberman & Shea 1994; Marean & Assefa 1999; Milo 1998; Minichillo 2005; Shea 2001, 2006a, b; Thackeray 1990; Thieme 2005). Effective hunting can therefore not be used as unambiguous evidence for modern human behaviour. However, hunting technology is directly related to subsistence behaviour, and both have robust archaeological consequences (Kuhn & Stiner

2001: 99), and the study of archaeological material relating to hunting weapons and activities could provide increased resolution for past behavioural trends and variations. Hunting with hafted, stone tipped or barbed weapons represents major technological innovations. Early evidence for such technologies is found in the southern African Middle Stone Age archaeological record (Brooks *et al*. 2006; Gibson *et al*. 2004; Lombard 2004, 2005; Villa & Lenoir 2006; Wadley *et al*. 2004).

Large-scale comparative work on technological and morphometric aspects of stone tools associated with hunting technology is being conducted (e.g. Brooks *et al*. 2006; Shea 2006a; Villa *et al*. 2005; Villa & Lenoir 2006). These studies are mainly concerned with the origins of projectile technology (weapons propelled by spearthrowers or bows), or the distinction between projectile weaponry and hand-delivered weaponry (thrusting or throwing spears). For example, Shea (2006) applied tip cross-sectional area (TCSA) analysis to representative samples of ethnographic and experimental projectile points, and to Middle and Upper Palaeolithic points from Africa, the Levant and Europe. The study provides a valuable dataset to assess the proposition that projectile technology was in widespread use amongst *Homo sapiens* populations in Africa during the Middle Stone Age. Although the results indicate that stone-tipped projectiles were not in common use in Africa, the Levant or Europe prior to about 40 ka ago, the project expanded our understanding of Stone Age hunting behaviour, and highlighted issues for future research (Shea 2006). For example, there are still uncertainties about the association of some Middle Stone Age tools, such as thin elongated Still Bay points and Howiesons Poort segments (sometimes also referred to as lunates or crescents) with hunting weapons. Both tool classes have also been described by some researchers as symbolic or non-functional (Deacon & Wurz 2005; Marean & Assefa 2005; Minichillo 2005; Wurz 1999).

Unlike morphometric methods, use-trace analyses, such as macro-fracture studies, can contribute comparable data about the potential hunting function of stone tools independent of their morphology. Where feasible, micro-residue and use-wear

analyses could provide further detailed functional information or explore the hafting technologies associated with the tools. These methods might not yet be suitable to distinguish between projectile and hand-delivered hunting weapons. However, they can provide data and direct evidence for functional interpretations that could be used to evaluate propositions based on other methods and thereby contribute to broader technological interpretations and behavioural models. My questions within this context are: were some Howiesons Poort and Still Bay tools hafted and used for hunting, and if so, is it possible to distinguish marked differences between the hafting and hunting technologies of these two technocomplexes using use-trace analyses?

1.3.2 Change in hunting and hafting technology during the Middle Stone Age

The Middle Stone Age is generally characterised as being a period of technological stasis where the forms and types of tools remain relatively unchanged or change occurs at a slow pace (Hovers & Belfer-Cohen 2006; Kuhn & Steiner 1998; Bar-Yosef 2000). This 'fidelity of form' was perceived to be unaffected by environmental or ecological variation (Foley & Lahr 2003), and considered part of a continuum interpreted as demonstrating pre-modern behaviour (d'Errico & Backwell 2005). Wurz (2005) points out that this is probably due more to a lack of detailed studies than a real stasis in technological evolution. She emphasises that new analyses of multi-layered sequences and inter-site comparisons of data are crucial to understand the Middle Stone Age record in terms of the emergence of modernity (Wurz 2005).

A key question is whether the archaeological record associated with anatomically modern humans in southern Africa provides evidence for a cognitive system undergoing change (Henshilwood & d'Errico 2005: 251). There is now evidence to suggest that both the Howiesons Poort and the Still Bay are temporally discrete and regionally restricted entities (Deacon & Wurz 2005; Marean & Assefa 2005; Tribolo *et al.* 2005; Wadley 2005a, 2006b, in press). While a consensus might be forming to support the recent African origin for modern humans, we still understand little about the behaviours and ways of life of early anatomically

modern humans. Even though we know that they were adept at fitting themselves into well-rehearsed ecological niches there is still uncertainty about the static *vs*. dynamic nature of their technologies, subsistence behaviours, and associated social structures (Kusimba 2002).

Previous use-trace analyses showed that post-Howiesons Poort points were used to tip hafted hunting weapons, and that ochre could have been part of post-Howiesons Poort and Howiesons Poort hafting adhesives (Gibson *et al*. 2004; Lombard 2005a; Wadley *et al*. 2004a). Complex though hafting might seem to be, its practice is probably not restricted to modern human behaviour (Hardy *et al*. 2001; Rots & van Peer 2006; Boëda *et al*. 1996; Thieme 2005; Wadley 2006a). In order to amplify our knowledge of Middle Stone Age hafted hunting weapons, this study will expand on these themes and start to investigate possible changes in hunting and hafting technologies. Changes in the use of ochre in association with mastics will also be explored. The aim of this detailed exploration is not to distract from the possible ritual or symbolic value of ochre (Deacon 1995; Henshilwood *et al*. 2002; Hovers *et al*. 2003; McBrearty & Brooks 2000; Watts 2002), but to provide enriched data and added resolution for its use and value during the Middle Stone Age. Here I ask whether it is possible to detect changes with regard to hunting and hafting technologies throughout the Middle Stone Age sequence with use-trace analyses, and whether there are similarities or differences in the use and hafting technologies of similar technocomplexes at different sites.

1.3.3 Change during the Howiesons Poort

Hunter-gatherers use the interplay of environment, technology, and social interaction to negotiate and operate in a real world, a world of opportunity and considerable risk. According to Kusimba (2002: 111), early modern hunter-gatherers learned to present the world around them symbolically. This allowed them to exchange, disseminate, and store information about their surroundings and to create dynamic and flexible technologies to extract sustenance from them, giving them an evolutionary advantage. Similar to the findings of Wadley and Harper (1989) and Soriano *et al*. (in press) at Rose Cottage Cave, Kusimba (2002)

noted that the Howiesons Poort at Nelson Bay Cave possesses several variants. These observations demonstrate that complex hafted tools were undergoing shifts in technological design within the *c*.10 ka span of the Howiesons Poort technocomplex itself. For Kusimba (2002) these changes fit the requirements of different technological styles, which involved changes in raw material selection, tool manufacture, and tool function – and style, by definition, will eventually drift and change (Kusimba 2002: 184; also see Wurz 1999). The shift in Howiesons Poort tools through the sequence fits the expectations of time-restrictive patterning (Beyers 1999, but also see Wadley 2001), indicative of a system of learning, innovating, and transmitting technology. When one considers that the South African Middle Stone Age sequence includes other restricted industries such as the Still Bay that predates the Howiesons Poort (Henshilwood *et al*. 2001; Rigaud *et al*. in press; Tribolo *et al*. 2005; Wadley 2006b; Wadley & Jacobs 2006), the argument for relatively fine-grained time-restrictive patterning is strengthened (Kusimba 2002: 184). Kusimba (2002: 187) concludes that the Howiesons Poort and other Stone Age technocomplexes beginning around 70 ka ago might have been created by the first hunter-gatherers to do at least some things in the way modern hunter-gatherers do. Therefore, my question is; am I able to detect shifts in hafting and hunting technologies within the Howiesons Poort through use-trace analyses?

1.4 Theoretical context

From Kuhn (1962) onwards, scholars have discussed the effects of paradigms on scientific thought. Change in knowledge often occurs from paradigm shifts, which cast existing facts in a new light, rather than from the accumulation of new data. However, this does not detract from the importance of new empirical evidence that can lead to the strengthening, evaluation or rejection of proposed views (Stahl 2005; Trigger 1989, 1990; Wylie 1989b). There is a broadening awareness that archaeological knowledge is shaped by the social, political and economic contexts in which it is produced (Gosden 2001; Hodder 2001; Shepherd 2002; Stahl 2005; Tilley 1989; Trigger 1990; Wylie 1989c). This is not so much a negation of scientific enquiry as an acknowledgment that the contexts and concerns that shape

archaeological inquiry are human products. As such, the goal of a critically aware science works towards understanding how contexts affect the resulting knowledge of the past (Gosden 2001; Meskell 2001; Wylie *et al*. 1989).

African archaeology is no exception, the presumptions, concerns and politics of the 'moment' shape the questions that archaeologists ask of the past (e.g. Robertshaw 1990; Stahl 2005; Trigger 1990), and will continue to do so in the future. For a variety of reasons, much of African archaeology is formed by insights gained from indirect sources. Historical reconstructions based on sources such as linguistics, ethnography and oral histories are often in place before archaeologists put 'spade to ground'. Such reconstructions provide readymade schemes into which archaeological data can be slotted as they become available (Stahl 2005). Unfortunately, this practice sets up a circularity of interpretation because the nature of the society in question is assumed from the start (Kusimba 2005). Thus, African archaeology has been plagued by many speculative reconstructions in the absence of empirical archaeological work (Kusimba 2005; Robertshaw 1990; Stahl 2005; Trigger 1990).

There are few direct – or indirect – sources of insight into the Middle Stone Age; the material evidence of archaeology is the primary direct source. Archaeological sources provide valuable evidence against which to assess models of the past. Binford (1977) used the sociological term 'middle-range theory' to characterise the body of theory within which archaeologists develop methods of inference that bridge the gap between what happened in the past and the archaeological record of today. A more critical argument presented by Schiffer (1987) sees the subject matter of archaeology as the relationship between human behaviour and material culture in all times and places, so that subsequent bridging arguments recognise the contexts in which they are created, avoiding the view that fact and theory are independent (also see Trigger 1995). Thus, recent research often treats archaeological evidence as a source of insight with the ability to extend our understanding and social modelling of the past (Mitchell 2003; Schmidt 1990; Stahl 2005; Trigger 1989, 1990; Wylie 2000). In South African Stone Age

research – and archaeology in general – the challenge is to establish convincing evidential support for social hypotheses (Binford 1981; Mitchell 2003; 2005; Salmon 1989). Disproportionate focus on generalising principles of human behaviour could invite over-generalisation, simplification of datasets and glossing over details that might be critical variables in understanding the complexities of past human behaviour (Gumerman 2001a, b; Kusimba 2005; Mitchell 2003). The approach of treating archaeological evidence as a source of insight with which some social models can be evaluated does not aim to replace all such models, or to separate archaeological data from theory. Rather, it aims to refine and deepen our understanding of the past in conjunction with considered theoretical models. Models can be augmented with archaeological evidence, or the evidence could be used to guide and channel the directions of further interpretative theorising (Wylie 1989a).

Many archaeologists are moving towards more inclusive approaches. The intention of this movement is to provide a rich, detailed, and plausible account of the past (Gumerman 2001a; Hegmon 2003; Wylie 1995, 2000). Hodder (2001) sees this acceptance of diversity and difference of perspective within the discipline as part of its new-found maturity in a fluid and complex context in which theory and practice are in a continual state of challenge and re-negotiation. These days, many researchers choose pragmatically, even eclectically, amongst theories and methods, thus being more flexible about accommodating direct archaeological evidence into behavioural hypotheses (Gumerman 2001a; Hegmon 2003; Hodder 2005). As an extension of this fluidity, there is a call for the acknowledgement of a bottom-up (method-to-theory) approach to increase data and empirical evidence for the augmentation and evaluation of robust behavioural models (Hegmon 2003; Klejn 2006; Lesure 2005; also see Trigger 1989: 389). This movement represents an evolution in understanding and deliberation of the past. However, it is understood that an initial theory determines the methods that are selected and, thus, there is a constant feed-back relationship between method and theory.

Against this theoretical background, this thesis endeavours to contribute to a dataset for hunting and hafting technologies and behaviours for the Middle Stone Age of South Africa. It aims to provide an enriched, detailed and plausible account of these activities in the past, based on archaeologically recovered data. I use micro-residue, usewear and macrofracture analyses to create multiple strands of evidence on which functional interpretations are based (e.g. Fullagar with Jones 2004; Hardy & Kay 1999; Hardy *et al*. 2001; Lombard 2005; Rots & Williamson 2004). Where necessary, replication work or blind tests are conducted to increase the accuracy of interpretations and to identify problem areas. This approach serves to counter the arbitrary imposition of tool functions or hafting technologies on Middle Stone Age tools. The empirical work is considered necessary, because many behavioural models for the Middle Stone Age hinge on activities such as hunting with hafted, stone tipped weapons, or the view that certain tools were non-functional. Once these micro-strands of evidence are cabled into functional interpretations, they can be incorporated into broader themes and multidisciplinary research programmes. Results from the various studies can then be used as mutually strengthening and constraining strands in arguments that reinforce or evaluate broader social hypotheses or theories.

Wylie (1989a) demonstrated how this approach of ‘cabling and tacking’ could be used successfully to substantiate social models and determine behavioural structures. Here it is applied on micro- and macro-levels, widening the range of interpretative possibilities, but also limiting them with new empirically gained knowledge. This approach provides a basis for the critical assessment of what can be reasonably claimed about the Middle Stone Age cultural context concerning tool use and hunting and hafting technologies. Although there is a strong empirical component in the work it is not presented from a behaviourist or adaptationist perspective. Rather, it aims to produce incremental advances in understanding specific technological elements of Middle Stone Age life in South Africa, at the same time expanding the knowledge-base of human cognition and behaviour during this period. This approach was chosen with the explicit purpose

of promoting increased feedback between empirical findings in the Middle Stone Age archaeological record and theorised positions.

1.5 A political reflection

African prehistory has long been treated as 'ancillary' for at least two reasons: a) Africa was explicitly perceived as a 'late-comer' to technological and social developments highlighted by the narrative of world prehistory (e.g., agriculture, metallurgy, urban settlement and political complexity); b) there was an implicit perception that African prehistory was relevant to 'them', not 'us', underscoring the exclusion of Africa from 'we' (Stahl 2005: 9). The perception that Africa was at best a 'runner up' in the race of progressive development, drew on deeply rooted Western European imagery of Africa as a barbarous continent that stood outside the progressive human impulse. Africa was typically portrayed as the least progressive of continents. It was commonly believed that innovation in Africa was rare, that most inventions were singular, and that these subsequently spread through processes of diffusion and migration (Stahl 2005: Robertshaw 1990; Trigger 1989, 1990). The exclusion of Africans from 'us' –intimately linked to the dehumanisation of the slave trade – was thus combined with a general pessimism about the innovative nature of humans, with important consequences for the development of African archaeology (Stahl 2005: 10). Even today the message is often that Africa is still mute, illiterate and passive and that its story must be told by scholars living on other continents (Wadley 2005d: 38). Some papers written for this thesis were submitted to mainstream, international journals in order to ensure the dissemination of new research methods, new data and interpretations being developed and employed by Africans in Africa. Furthermore, a conscious effort was also made to support local journals in their endeavours to promote and publish southern African Archaeology.