The Middle Stone Age in West Africa: Lithics from the Birimi Site in Northern Ghana

Agatha Kenda Baluh
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THE MIDDLE STONE AGE IN WEST AFRICA: LITHICS FROM THE BIRIMI SITE IN NORTHERN GHANA

by

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Bachelor of Arts
University of Tulsa, 2009

Submitted in Partial Fulfillment of the Requirements

For the Degree of Master of Arts in

Anthropology

College of Arts and Sciences
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2017

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DEDICATION

For John Paul Baluh
ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to my advisor, Dr. Joanna Casey, for her guidance, patience, trust and incredible encouragement in my research efforts. Her comments and suggestions were both insightful and supportive. Her dinner parties and our conversations have greatly expanded my stomach and my understanding of the Middle Stone Age and lithic research. I would also like to thank my committee members, Dr. Sharon DeWitte and Dr. Andrew White, for their time, support, and invaluable help on this long journey. I would like to thank Dr. Alicia Hawkins for traveling to South Carolina, teaching me how to identify flakes, answering my questions, and spending hours sorting the Birimi assemblage with me.

I would like to thank my fellow classmates, especially Stacey Whitacre, Kelly Goldberg, Bri Farber, Mike Young, and Wes Patterson, who helped hone my understanding of anthropology, and who helped make many long nights worth it with humor, food, and commiseration.

My friends and family have all provided unwavering love and emotional support. A special thanks to my roommate, Stacey Whitacre, for her friendship and love. I would also like to thank my mom, my brothers, Graham, Claude, and John, and my sisters Elisabeth, Rachel, and Juliana, who all finally learned that I moved to South Carolina rather than North Carolina.
And finally, I would like to specially acknowledge and thank my husband, Vincent Chalaopak, for always offering me love, support, and encouragement, and for truly inspiring me to challenge myself. I will never forget the numerous road trips, video chats, and technical help that made this thesis possible.
ABSTRACT

The Middle Stone Age (MSA) began around 300,000 years ago and continued to around 20,000 years ago in Africa. During this time anatomically modern *Homo sapiens* emerged in Africa. Also during this period modern human behavioral traits appear gradually both temporally and geographically in Africa. This is in direct contrast to “human revolution” theories of modern human origins, which state that behavioral modernity emerged rapidly and quite late in the record around 40,000 years ago. Siliceous mudstone artifacts from the MSA component of the Birimi site in northern Ghana were analyzed using Individual Flake Analysis, helping to highlight this period of evolution. These lithics from Birimi demonstrate the presence of technological complexity and style, an extension of symbolism, both of which are argued to be indicators of modern human behavior. Birimi is presented in relation to other African MSA sites highlighting technological innovation and variability in the archaeological record.
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LIST OF ABBREVIATIONS

ESA................................................................. Early Stone Age
LSA................................................................. Late Stone Age
MSA................................................................. Middle Stone Age
CHAPTER 1
INTRODUCTION

The Middle Stone Age (MSA) in Africa ranges from as early as 300,000 years ago to as late as 20,000 years ago in some locations (Minchillo 2005; Opperman and Heydenrych). Important advances in the hominin line take place during the MSA, including the appearance of anatomically modern humans around 195,000 -160,000 years ago. In Europe this time frame is referred to as the Middle Paleolithic and is dominated by archaic *Homo sapiens* and, at the very end, the sudden appearance of anatomically modern *Homo sapiens sapiens* with their artworks and complex technologies. So dramatic is the shift from the Middle to the Upper Paleolithic that it has come to be thought of in revolutionary terms, as though anatomically modern humans emerged fully equipped to dominate the planet. This scenario is, however, very much at odds with the archaeological evidence from Africa where the MSA charts the long, slow transformation of modern humans gradually accumulating the technologies and social practices that arrive so suddenly in Europe. Understanding this period has been hampered by poor preservation and patchy research attention, problems that plague much of the work in Africa in general. Even more importantly it has been delayed by perspectives that regard the MSA as a time of stagnation in both technological innovation and social processes. This perspective makes very little sense, considering that this was the very moment when anatomically
modern humans emerged in Africa, and currently there is a heated debate concerning the appearance of modern behaviors that predate the earliest known modern human fossils. This research looks at the technology of the MSA occupation at the Birimi site, one of the few known MSA sites in West Africa, within the context of what is known about the MSA throughout the African continent. Rather than being a period of homogeneity and stagnation, the MSA is a time of significant variation and innovation in technology. Unlike the Middle Paleolithic technologies of Europe that disappeared with the appearance of modern humans, MSA technologies in Africa are modern and even at an early stage, are comparable to the Upper Paleolithic technologies that are regarded as being so revolutionary.

1.1 THEORETICAL ORIENTATION

Although *Homo sapiens* were anatomically modern quite early in the record, researchers debate when human ancestors became behaviorally modern. Some view the MSA as culturally stagnant with behaviorally modernity arriving suddenly and quite late in the record at 40,000-50,000 years ago, a view commonly referred to as the “human revolution” (Klein 1995; Mellars and Stringer 1989), while others view the MSA as a dynamic period with behaviorally modern traits appearing gradually in time and space (McBrearty and Brooks 2000). This research questions the “human revolution” interpretation of the archaeological record and demonstrates that there is significant evidence for modern human behavior and a wide variety of technology and innovation quite early in the
African MSA, earlier than is found in Europe. This thesis characterizes behavioral modernity by the presence of abstract thinking, planning depth, and symbolic behavior, though many researchers recognize a variety of behavioral and cognitive traits as being culturally modern (see Chapter 2).

The technology of the MSA is generally seen to be static or advancing very little, despite the great length of time that the MSA encompasses (Minichillo 2005; Klein 1999). This in turn gives rise to the belief that Africans of the MSA were an unchanging, ‘primitive’ people. Further cementing this idea are comparisons of the African MSA to the European Paleolithic. Historically comparisons were made between the MSA and the European Upper Paleolithic, for these periods were originally thought to be contemporaneous. Comparing these two periods was problematic because the Upper Paleolithic is a period of time noted for great advances in technology and art including pottery, figurines, paintings, complicated lithics, and jewelry, whereas in comparison, the MSA does not appear to offer a proliferation of these works (Minichillo 2005; McBrearty and Brooks 2000). Now, with the help of better dating techniques, researchers know that the Middle Paleolithic is contemporaneous with the MSA. However, comparisons are still made between these two distinct regions and are still problematic. The Middle Paleolithic is associated with archaic Homo sapiens and is a period frequently presented as lacking modern behavioral traits, leaving the impression that human ancestors during this time were physically and culturally primitive. Interchanging the Middle Paleolithic with the MSA, then in turn, leaves one with the notion that the African MSA is primitive, perhaps even more so than
its European contemporary, for there are physically modern *Homo sapiens* skeletons at this time in Africa. Other researchers (McBrearty and Brooks 2000; Stahl 2005) suggest that such interpretations are flawed, Eurocentric, and fail to account for the actual depth and breadth of the African archaeological record where modern behavioral traits appear gradually in different regions and at different times.

This thesis will take into account often reproduced Western notions of Africa as ‘traditional’ or ‘primitive’, misconceptions surrounding ages and stages in African archaeology, and Time and Deep Time. An examination of how such representations became constructed and how they may be dismantled will be explored using the works of McBrearty and Brooks (2000), Stahl (1999, 2005, and 2007), Fabian (2002), and Trouillot (1991) among others.

1.2 METHODOLOGY

The Birimi MSA assemblage considered for this thesis consists of lithic debitage largely made using the same technology, Levallois, and knapped on the same material, siliceous mudstone. Lithic debitage, defined as flake and debris by-products produced during the manufacturing and maintenance of stone tools, coupled with stone tools themselves are the most common artifact found at MSA sites, and are the primary way researchers today can study and interpret this time period (Andrefsky 2001, 2005). Many different methods of analysis, including Stanley Ahler’s (1989) Mass Analysis (MA) and the commonly used Individual Flake Analysis (IFA), were considered for analyzing the Birimi
assemblage; details and full descriptions are provided in Chapter 4. MA uses a constant standard to stratify the debitage assemblage, such as size or weight, and then compares the frequencies of debitage in each stratum (Ahler 1989; Andrefsky 2005; Shott 1994). This stratification highlights the differences and similarities in the lithic population and is then used to make interpretations. IFA, on the other hand, involves individually observing each artifact and examining select attributes like color or material across the entire population (Andrefsky 2001).

After considering the criticisms of each technique and what information each may offer, I decided to proceed with IFA. Andrefsky criticizes MA because “sources of error may originate from differences in individual flintknapping styles and techniques, raw material size and shape variants, and mixing debitage from more than one reduction episode” (Andrefsky 2007:392). IFA is often criticized for being hard to replicate and for being time consuming (Ahler 1989; Fish 1978; Odell 2003; Shott 1994; Sullivan and Rozen 1985). Although analyzing numerous attributes on every specimen will be time consuming, IFA is useful, for it will allow me to analyze each flake’s morphology and technology, which will help reveal variation within the Birimi assemblage and better highlight distinct technological styles. MA, on the other hand, may mask some technological styles in error due to mixed debitage or other factors. I will mitigate replication error in my IFA approach by providing clear definitions of terminology and by offering detailed descriptions of all measured attributes. IFA will then allow me to provide
a clear description of the assemblage and deliver an analysis that lends itself to comparison, a priority for this understudied region.

IFA analysis will require the sorting of the artifacts into types followed by attribute analysis. Types will include flakes, cores, tools, and debris. Attribute analysis will include general morphological characteristics (maximum length, width, height, weight, color, etc.), and it will also include technological characteristics (platform preparation, direction of dorsal scars, usewear, etc.) A complete list of considered attributes, how to measure them, and their definitions are included in Chapter 4.

1.3 RESEARCH QUESTIONS

The information collected using IFA will be used to answer a variety of research questions regarding the MSA people of Birimi and how this assemblage fits into a wider conversation on the MSA. The question of whether the MSA is stagnant and homogenous in time and space can be answered by the presence or absence of technological variation and behavioral complexity. The following research questions guide this thesis in answering that principal question.

(1) What is the nature of the MSA assemblage of Birimi?

(2) Does this assemblage reveal modern human behavior, and if so, how?

(3) How does the MSA of Birimi compare to the greater MSA of Africa and to the MSA of West Africa in particular?

Answers to these questions are significant because they will speak directly to the “human revolution versus human evolution” debate. These answers will also fill gaps in the MSA archaeological record of West Africa, for Birimi is
uniquely situated to answer questions of the deep past, being one of the very few dated MSA sites in the region (Hawkins et al 2001:278).

1.4 ORGANIZATION OF THIS THESIS

This thesis is organized into five additional chapters that discuss, contextualize, and analyze the presented issues. Chapter Two frames the discussion of the African MSA by examining theoretical notions of cultural evolution, and by reviewing often reproduced and biased Western notions of Africa and Time. Chapter Three offers general background information and a literature review of the African MSA, previous MSA studies in West Africa, and an outline of the Birimi site. Chapter Four gives a detailed explanation of the methodological approach employed in this study. Chapter Five presents the results of the IFA analysis. And, Chapter Six offers a discussion of the results of the analysis, explains how the Birimi assemblage fits into the greater MSA, and highlights future avenues researchers may explore in their studies of the African MSA.
CHAPTER 2

A VIEW OF THE AFRICAN MSA: CULTURAL REVOLUTION VS. EVOLUTION

The African Stone Age is often compared to the European Paleolithic. Archaeological and evolutionary parallels between the two periods are sought and frequently expected. However, in terms of developments in prehistory, the records of Africa and Europe are distinct and do not mirror each other. The MSA and the Middle Paleolithic are both situated in “the middle” between the Early Stone Age (ESA)/Lower Paleolithic and the Late Stone Age (LSA)/Upper Paleolithic. However, these middle periods are associated with different hominins and different technologies. In this chapter, I will demonstrate how and why the African record has been conflated with the European record. Eurocentric comparisons have held reverberating consequences for studies and descriptions of African archaeology, specifically the African MSA. Parallels between Europe and Africa should not be expected. The African archaeological record should be accepted on its own terms. Arbitrary archaeological stages hurt our understanding of the African record and blind us to the actual patterns present.

I will offer a way to dismantle some of these Eurocentric and ill begotten notions by examining the African archaeological record. Specifically, I will discuss how the Birimi MSA assemblage may reveal modern human behavior through technological complexity and through the presence of style, both of which are used as criteria for indicating behavioral modernity. I will discuss how Time and
the “Othering” of African inhabitants have stunted an accurate representation of African history and the archaeological record. Such failings have painted Africa as a cultural backwater, while simultaneously presenting Europe as a technological beacon for humanity.

2.1 AN OVERVIEW OF THE CULTURAL REVOLUTION VS. EVOLUTION DEBATE

One of the most important debates in African archaeology today is over the beginning of behavioral modernity and how to recognize it. This debate is complicated by comparisons between the European and African archaeological and evolutionary record. Some of the more common criteria that researchers use to define modern behavior include the presence of blade technology, worked bone and antler, more standardized, diverse and complex tools including composite tools, improved hunting methods, increased exploitation of small animals and marine resources, decorative arts, elaborate burials and increasing use of harsh environments (see Table 2.1) (Henshilwood and Marean 2003:628; McBrearty and Brooks 2000:492). As Henshilwood and Marean (2003:631) point out, most of these traits are those that arrived suddenly in Europe with modern Homo sapiens sapiens near the beginning of the Upper Paleolithic. This has led some researchers to conclude that behavioral modernity arrived abruptly in Europe around 35,000 to 50,000 years ago (Bar-Yosef 1998; Klein 2000; Klein 1995; Mellars 1989; Mellars and Stringer 1989). This model is often referred to as the human revolution.
<table>
<thead>
<tr>
<th>Archaeological signatures of modern human behavior</th>
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<tr>
<td><strong>Ecology</strong></td>
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<tr>
<td>Range extention to previously unoccupied regions</td>
</tr>
<tr>
<td>(tropical lowland forest, islands, the far north in Europe and Asia)</td>
</tr>
<tr>
<td>Increased diet breadth</td>
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<tr>
<td><strong>Technology</strong></td>
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<tr>
<td>New lithic technologies: blades, microblades, backing</td>
</tr>
<tr>
<td>Standardization within formal tool categories</td>
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<tr>
<td>Hafting and composite tools</td>
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<tr>
<td>Tools in novel materials, e.g., bone, antler</td>
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<tr>
<td>Special purpose tools, e.g., projectiles, geometrics</td>
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<tr>
<td>Increased numbers of tool categories</td>
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<tr>
<td>Geographic variation in formal categories</td>
</tr>
<tr>
<td>Temporal variation in formal categories</td>
</tr>
<tr>
<td>Greater control of fire</td>
</tr>
<tr>
<td><strong>Economy and social organization</strong></td>
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<tr>
<td>Long-distance procurement and exchange of raw materials</td>
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<tr>
<td>Curation of exotic raw materials</td>
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<tr>
<td>Specialized hunting of large, dangerous animals</td>
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<tr>
<td>Scheduling and seasonality in resource exploitation</td>
</tr>
<tr>
<td>Site reoccupation</td>
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<tr>
<td>Intensification of resource extraction, especially aquatic and vegetable resources</td>
</tr>
<tr>
<td>Long-distance exchange networks</td>
</tr>
<tr>
<td>Group and individual self-identification through artefact style</td>
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<tr>
<td>Structured use of domestic space</td>
</tr>
<tr>
<td><strong>Symbolic behavior</strong></td>
</tr>
<tr>
<td>Regional artefact styles</td>
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<tr>
<td>Self adornment, e.g., beads and ornaments</td>
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<tr>
<td>Use of pigment</td>
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<tr>
<td>Notched and incised objects (bone, egg shell, ocher, stone)</td>
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<tr>
<td>Image and representation</td>
</tr>
<tr>
<td>Burials with grave goods, ocher, ritual objects</td>
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However, McBrearty and Brooks (2000) and others (see Clark 1999; Henshilwood and Marean 2003; Stahl 2005) argue vehemently against such notions stating that behavioral modernity was a gradual process across the globe, refuting the belief that it was a fast revolution. In the African archaeological
record anatomically modern humans are found quite early, more than 100,000 years ago, but it has been argued that there is a time lag in behavioral modernity which is supposedly not visible until 40-50,000 years ago (McBrearty and Brooks 2000: 453; Mitchell 2002). Although there are certainly different definitions and ingredients used to characterize behavioral modernity (see Table 2.1 above), evidence from Blombos Cave, South Africa and numerous other sites actually point to behavioral modernity quite early in the record, ironically, earlier than is found in Europe (McBrearty and Brooks 2000). Examples of such behavioral modernity include artifacts like shell beads and ornaments found at numerous sites including Border Cave, South Africa and Aterian sites like Grotte Zouhra, Morocco (Debénath 1994; d'Errico et al 2008). Other examples include bone points from Blombos Cave, South Africa and Katanda, Democratic Republic of the Congo, formally Zaire (Henshilwood and Sealy 1997; Yellen et al 1995). Different signatures of modern human behavior appear in different locations and times throughout Africa, the MSA is not homogenous; change took place gradually and looks different across the continent.

This debate stems in part from a problematic Eurocentric view of the prehistoric record of Africa where time is divided into ages or stages or even into events. These Western notions stem from the Standard View, a master narrative that frames the human story on a single timeline progressing from simple to complex (ex: savagery, barbarism, and civilization or Stone, Bronze, and Iron Ages) (Hall 1996; McBrearty and Brooks 2000; Pfaffenger 1992; Stahl 2005). Fabian (2002) believes that ages and stages serve to maintain “talk about
primitive mentality” and time evaluated in terms of events or as binaries, such as historic vs. prehistoric or traditional vs. modern, becomes a measure of advancement or quality rather than actual linear time (Fabian 2002: 23). A review of the terminology associated with African history and the prehistoric records are all wrought with Eurocentric notions of time and in some manner deny the complexity of African history.

The first problem found in descriptions of the Middle Stone Age is the name itself. The term was applied to Africa's history by European scholars, and as Ann Stahl notes it “…understandably, drew on their knowledge of European sequences in forging a typological framework” (Stahl 1999: 41). Thus, even in the naming of the age, European time is mapped onto and compared to time in Africa.

This immediately becomes problematic because “technologically defined ages were not necessarily synchronous in all areas (i.e. the “Middle Stone Age” in one area might be contemporaneous with the “Later Stone Age” in another)” (Stahl 1999: 41). This statement also highlights the second problem with the MSA, for it is not a uniform age that begins at one specific time and ends at another. In fact, problems of age/stage terminology are well recognized by archaeologists (see Stahl 1999: 41-42; Stahl 2005: 7; Casey 2005: 225; Fabian 2002: 23), but they are still reproduced. Stahl says, “Indeed, even those synthetic volumes that have deliberately avoided the terminology of the Big Sequence are still organized according to its logic” (Stahl 1999: 41).
One additional problem with descriptions of the MSA, specifically linking the MSA to Europe’s Middle Paleolithic Age or Upper Paleolithic, is the implication that the African material record should progress along the same lines as Europe’s. Regional differences in the archaeological record can then be viewed as more or less progressive. Stahl highlights the two reasons why African prehistory is often viewed as less advanced when compared to Europe’s: (1) Africa is perceived as a technologically and socially delayed compared to other areas; and (2) African prehistory is seen as irrelevant to the West, highlighting a “them” versus “us” mentality (Stahl 2005: 9). Essentially, Africa’s failure to follow a rapid European progression model leaves the impression that it is culturally stagnant, however, the recent work by McBrearty and Brooks (2000) questions this line of thought.

Archaeologists in the 1920s recognized that the Europe’s Paleolithic model did not match the archaeological record in Africa, so the Early, Middle, and Late Stone Age terminology was created to demonstrate Africa’s distinct nature (McBrearty and Brooks 2000: 456). However, a strong correlation between the ages still existed. Originally, the Middle Stone Age was considered to be the equivalent of the Upper Paleolithic and dated to a period beginning less than 60,000 years ago. In Europe, this time period is associated with evidence of modern human culture such as bone tools, artworks, beads, and burials. McBrearty and Brooks demonstrate the problem with linking these two ages: “The rarity of elements regarded as critical to modern human culture in the MSA served as grounds for regarding Africa as a “cultural backwater,” the place that
initially gave rise to humanity, but failed to nurture its later development” (McBrearty and Brooks 2000: 457).

In the 1970s better dating technology pushed the MSA back more than 100,000 years and it became linked to Europe’s Middle Paleolithic. The Middle Paleolithic, a period largely associated with Homo neanderthalensis and Mousterian technology, a technology known for prepared core techniques like Levallois and discoid, various scrapers, denticulates, notched pieces, points and retouched points (Gamble 1999; Kuhn 1995). The MSA, on the other hand, is associated with anatomically modern Homo sapiens, long retentions of the same technology, and only gradual evidence of more varied and advanced technologies. This linking of European time with African time is particularly problematic for the African record, for the MSA-LSA transition in Africa took place over a long span of time and was marked by gradual transitions in technology, whereas in Europe, as classically represented, there were specific revolutions in technology between the Middle Paleolithic and Upper Paleolithic. McBrearty and Brooks state: “As a result, the MSA-LSA transition has been conflated with the Middle to Upper Paleolithic transition and the emergence of modern human behavior. Consequently the earliest anatomically modern humans, which occur in MSA contexts, are not accepted as fully “human”” (McBrearty and Brooks 2000: 457). They are not considered fully human because they are perceived to lack modern human behavior, which is seen as readily present in the “revolutionary” technology and cultural artifacts available in Middle to Upper Paleolithic contexts. The MSA is not a uniform age and should not be expected to progress along the
same time line as its European counterpart. This perpetuates the belief that peoples of Africa are more primitive than Westerns.

2.2 A SEARCH FOR MODERN HUMAN BEHAVIOR IN THE MIDDLE STONE AGE: SYMBOLS, STYLE, AND TECHNOLOGY

Modern human behavior is often recognized in the archaeological record through a variety of traits (Table 2.1); however, the accuracy of these signifiers has been questioned. Henshilwood and Marean (2003) note that many of the traits used to recognize modern human behavior are poorly theoretically grounded which undermines their usefulness. For example, the authors criticize linking modern human behavior to mobility strategies employed by hunters. Klein and Cruz-Uribe (1996) argue that MSA individuals occupied the coast in South Africa year round and were unlikely to recognize seasonal peaks in fur seal, instead killing and scavenging opportunistically. Henshilwood and Marean (2003) undermine this argument by pointing out that wild dogs in the Serengeti exploit a seasonally moving resource as do spotted hyenas, and it is a weak argument to say that such animals were smarter than MSA hominins who had vastly larger brains, thus this seasonal mobility trait lacks justification. This highlights the need to develop theoretically sound criteria for determining modern human behavior.

Ultimately Henshilwood and Marean (2003) decide that two primary features indicate modern behavior: external symbolic storage and style as negotiated group identity. These behaviors are manifest materially in decorative embellishments, artworks and items of personal adornment. They are also evident in the choices people make among the available options, choices that
can allow archaeologists to recognize different groups of people by their preference for particular styles of material expression, or particular technological styles as ways of doing things. Henshilwood’s incised ochre evidence from Blombos Cave, South Africa (Henshilwood et al. 2002) and Brooks’ carved bone points from Katanda, Democratic Republic of the Congo, formally Zaire (Brooks et al. 1995) are easily recognized as external symbolic behavior in the MSA, and both are dated to before 70,000 years ago (McBrearty 2003).

In fact, many archaeologists would agree that the use of symbols is an indicator of modern human behavior (Clark 1999; Henshilwood and Marean 2003; Mellars 1989). Symbols are anything that “…in some way refers to or represents something beyond itself” (Mellars 1996: 369). Visual symbols are reflected in artworks, ornaments, and ceremonial burials among other things. Another common example of symbolism is language, for words are meaningless without a referent. Thus many researchers have searched for evidence of early language by studying the brain, speech organs and function, stone tools, primate communication, and hominin fossils, but it is difficult to find conclusive evidence for early language in the archaeological record (McBrearty and Brooks 2000). Bar Yosef (1998) suggests that growing fossil evidence points to the acquisition of language around 400-300 thousand years ago. One fossil in particular, a modern-looking hyoid bone of a Neanderthal at Kebara Cave, Israel, indicates that human ancestors have used language since at least the Middle Paleolithic (Bar Yosef 1998: 154), though other researchers question this evidence (Lieberman et al. 1992).
Language acquisition or symboling would help explain the changes in the archaeological record during the Middle to Upper Paleolithic transition and during the MSA-LSA transition. It is largely agreed that early humans did have symbolic and communication abilities, though to what extent is debated (Clark 1999; Lieberman et al. 1992; McBrearty and Brooks 2000; Mellars 1989; Klein 2000). Language would allow for a discussion of future events (cognitive planning) as well as of past events (potentially drawing lessons from them) (Mellars 1989: 364). This would affect how modern humans planned and organized their behavior, including how they planned and organized their technology. Identifying symbolism in lithic artifacts is very complex and contentious, and it is often tied to stylistic variation (Clark 1999; Henshilwood and Marean 2003). Wobst (as cited in Clark 1999:104) writes that style and symbolism are connected, for style allows for information exchange, and in the process represents something beyond itself.

Many archaeologists define style differently (see Chase 1991; Lemonnier 1986; Pfaffenberger 1992; Sackett 1982; Wiessner 1983, 1984). One author, Wiessner, writes that style is the “formal variation in material culture that transmits information about personal and social identity” (Wiessner 1983: 256). In Wiessner’s (1983) landmark article, she divides style into two types: emblemic style and assertive style. Emblemic style is a conscious means of using formal variation in material culture to establish group identity or boundaries. Assertive style, on the other hand, is style that is employed to communicate information about individual identity. It has the ability to distinguish the individual from others, but may also communicate a belonging to various groups (Wiessner 1983:258).
Emblemic style is an active and conscious way of transmitting information about
group identity, whereas assertive style may be either a conscious or unconscious
way of communicating information about personal identity.

Sackett (1982), however, takes a different approach to style. Sackett
(1982) divides style into two main types: isochrestic style and iconological style.
Isochrestic style equates ethnicity with functionally equivalent choice. Sackett
believes that style is complementary to function, and may be present "wherever
artisans en-counter options of form and use to "choose" from in pursuing a given
task" (Sackett 1982: 59). Although an artisan may be restricted by the physical
properties of the raw material used or by the necessary mechanical requirements
of the tool or object being created, choice and thus style is still present on some
level during the manufacturing process (Clark 1999). Sackett (1982) believes that
the style ultimately chosen is often dictated by group identity, which determines
what is culturally appropriate. In direct contrast to Wiessner (1983), this
isochrestic style may be a passive or an unconscious indicator of group identity.
Sackett’s (1982) second type of style, iconological style, matches more closely
with Wiessner’s (1983) view of style in that it is “formal variation that artisans
purposefully invest with symbolic content reflecting self-conscious social groups”
(Sackett 1982: 59). Iconological style is active and consciously chosen style.
Clark (1999) centers the importance of this discussion on style. She writes,
“Regardless of the debate over the active or passive role of style, both definitions
incorporate the notion that style contains a symbolic component” (Clark 1999:
105). Thus it is possible that a style component present in lithic artifacts may
indicate symbolism, a criterion for modern human behavior. If a style component is present in the MSA lithics of Birimi, then it can be reasonably argued that modern human behavior is present in the Birimi assemblage.

Although these two features, symbolism and style, are ideal indicators of modern human behavior, they are not the only ways to recognize cultural modernity in the archaeological record. The type of lithic technology used may also point to behavioral modernity. McBrearty writes that technological complexity is in and of itself an indicator of modern human behavior because it implies the presence of social learning (McBrearty 2003). Although complex technological knowledge does infer social learning, such learning does not necessarily have to have a verbal component, which is useful given language acquisition is hard to trace in the archaeological record. Pfaffenberger writes about nonverbal learning and says, “...an enormous amount of technological knowledge is learned, stored, and transmitted by experiential learning, visual/spatial thinking, and analogical reasoning” (Pfaffenberger 1992:507) It is possible knappers learned a specific technique, say the Levallois method of flintknapping, by experimenting or through visual social learning (Wynn and Coolidge 2010:97). Pfaffenberger (1992) goes on to criticize researchers of human evolution and their fixation on language, tools, and intelligence. He argues that language and tools are overprivileged, and advocates that researchers instead focus on nonverbal cognition and sociotechnical systems to fully understand the evolutionary changes in human technical activities (Pfaffenberger 1992: 514). A sociotechnical system is “an activity system, a
domain of purposive, goal-oriented action in which knowledge and behavior are reciprocally constituted by social, individual, and material phenomena” (Pfaffenberger 1992: 508). Leaving aside the language and symboling debate, let us return to and explore the idea that technological complexity can indicate modern human behavior.

It has been argued that the Levallois technique and its by products reveal modern human behavior and cognition through special preparation and predetermined mental planning (Schlanger 1996). Schlanger credits François Bordes with defining the Levallois technique as being a form of flint knapping that requires (1) a predetermined mental image of the desired end piece and (2) special preparation of the core, especially the platform, to attain the mental image (Schlanger 1996: 232). The knapper must then possess the concept of the procedure to be followed (the stages of Levallois manufacture), abstract thought (by envisioning the desired end piece), and mental planning (a way to adapt the raw material to the procedure). Schlanger (1996) analyzes and refits a Levallois core, named the Marjorie core, in order to determine the knapping process and infer the cognitive process such knapping would require. Schlanger (1996) determined that the Levallois knapper envisioned the desired end goal or flake and had a mental map on how to accomplish it, but was ultimately able to adapt the predetermined mental plan based on the unpredictable knapping error or imperfect raw material. He writes, “Insofar as it maintains its goals while accommodating changing circumstances, the principle at work on Marjorie’s core can be said to have plan-like properties” (Schlanger 1996: 247). This cognitive
planning and fluid adaptability together indicate exceptional intellectual abilities. In fact, Wynn and Coolidge argue that Levallois reduction requires expertise on par with expert performance and cognition used by contemporary humans during technical activities (Wynn and Coolidge 2010: 89). Expert performance "is based on the ability to rapidly access well-learned patterns, knowledge, and procedures that have been stored in long-term memory over the course of years’ practice. This style is largely nonverbal" (Wynn and Coolidge 2010: 101). Wynn and Coolidge (2010) use Marjorie’s core, a Levallois knapped core, from Schlanger’s (1996) article as an example of expert performance. This links the Levallois flintknapping technique to modern human behavior, and thus if the Levallois technology is present in the Birimi MSA assemblage, than modern human behavior is also present.

A discussion of how modern human behavior can be identified in the archaeological record, namely through the presence of complex technology and style as it relates to symbolism, has been presented. The identification of these traits throughout the MSA geographically and temporally supports McBrearty and Brooks (2000) theory that modern human behavior does not appear all at once around 40,000 years ago, but instead appears gradually throughout the MSA. This in turn refutes the human revolution model of cultural evolution.

Unfortunately, answers to this debate do not necessarily solve problems surrounding the presentation of Africa as cultural stagnant, traditional, and primitive. These problems are not unique to archaeology. They are well embedded in studies of African history and Western views of the world. The
remaining sections will discuss how these problematic views of Africa were constructed and how they have stunted an accurate representation of African history and the archaeological record.

2.3 THE SAVAGE SLOT

Trouillot (1991) finds that anthropology’s *raison d’être* sprang from a Western desire to study the Other, the unknown, the primitive, the savage. He states: “Anthropology did not create the savage. Rather, the savage was the *raison d’être* of anthropology. Anthropology came to fill the savage slot…” (Trouillot 1991: 40). He believes that the creation of the Other arose from the ‘discovery’ of the New World by Columbus in 1492, implying the creation of the Other rose from Western contact with non-Western peoples. Stuart Hall adds to this, noting that the Portuguese were exploring the African coast as early as 1430 (Hall 1996:190). Emerging from this Age of Discovery (loosely 15th-18th century) and the later Age of Colonial Expansion (19th-20th century) were accounts of other lands and peoples, travel narratives, colonial surveys and maps, ethnographic reports, and even fictional utopias (the line between which was not always clear). These travel accounts and writings obliterated Europe’s microcosm creating both a sense of self and a sense of the Other (Trouillot 1991). Hall (1996) also identifies that Europe, the “West”, began to identify itself as an entity and as an opposite to the Other during the Ages of European Expansion. He writes,

…Europe began to define itself in relation to a new idea—the existence of many new “worlds,” profoundly different from itself.
The two processes—growing internal cohesion and the conflicts and contrasts with external worlds—reinforced each other, helping to forge the new sense of identity that we call “the West. (Hall 1996:197)

The conflicts that Hall mentions here occurred over many centuries and include challenges to and from the Islamic world—the Moor Invasion and the Crusades—and challenges from the East—the Mongol and Tartar invasions from Central Asia (see Hall 1996:196-197).

These travel writings also fed a demand for knowledge of the Other, the elsewhere, and often, the public as well as some scholars did not necessarily care if such descriptions were realistic or accurate. Mbodj (2002) writes that exaggerations and misrepresentations of lands and peoples were often depicted on 16th and 17th century maps. Unknown terrains were filled in with geographical guesses and colorful or sometimes fantastical depictions. “Big animals, costumes, cities, and kings were the favorite theme. Images of strange peoples were juxtaposed with biblical episodes and ancient myths” (Mbodj 2002:45).

Typically, such maps were produced in color and with images for scholars, rulers, and the wealthy, whereas maps with distances and navigational instructions were produced separately for sailors in black and white (Figure 2.1) (Mbodj 2002).

These maps and travel writings were frequently inaccurate or exaggerated, and they were often marketed to the public as entertainment, while seemingly providing knowledge of other lands, peoples, and cultures. Anthropology as a field emerged from this demand for knowledge of the Other, slowly severing the imaginary from the believed scientific. “Anthropology came to fill the savage slot of a larger thematic field, performing a role played, in different ways, by literature
and travel accounts—and soon to be played, perhaps, by unexpected media…” (Trouillot 1991:29).

Figure 2.1 Map of Africa by Sebastian Münster, an Influential Cartographer of the Mid-16th Century (Münster, 1554).

In addition to Europe’s nascent sense of self and its binary reflection, the savage, Trouillot (1991) lists two other themes that contributed to the West’s sense of self and its general conception of the world: (1) a vision of utopia (the ideal state) and (2) a vision of order (the ideal state of affairs). Order includes that which was imposed on the savage, but also order within the West itself, especially political and ideological order. Trouillot sees this thematic trilogy
(savage, utopia, order) as being the shaky baseline upon which anthropology is constituted.

Hall (1996) writes in a similar vein to Trouillot about the creation of the Other or “the Rest” and its link to the foundation of social science. Hall demonstrates that the creation of social science stems from the Enlightenment and social theories of man (Hall 1996). Social scientists of the Enlightenment period examined early stages of socio-economic development, contrasted “civilized nations” and “savages and barbarians,” and helped to form the theoretical framework for the idea that humans developed along a single sequence, divided into a series of stages that ended with modernity or civilization, though theorists differed on what factors drove these stages (Hall 1996: 220). The enlightened or the West was purported to be the apex of modernity, of progress, of civility, and was proved as such with discursive language and figures like the “noble vs. ignoble savage” and “rude and refined nations” (Hall 1996:221). So the Other or “the Rest” as an opposite or binary was formed by and help form the Enlightenment, the West, and modern social science.

Although both Trouillot (1991) and Hall (1996) trace the beginnings of anthropology/social science to the formation of the Other and the West in their articles, they recognize that these fields and the consequent foundations or ideas upon which they are built are not relegated to the past alone. Hall (1996) recognizes that the creation of the Other and the way in which the West talks or writes about it and itself in relation to the Other, became a powerful discourse
that shaped perceptions and practices, including practices within anthropology that continue today. Trouillot (1991) recommends a future anthropology that is critical and reflexive, one that condemns these traditional themes of savage, utopia, and order, but one that also studies their history and how they helped shape the discipline (Trouillot 1991:22-23). Anthropologists must recognize and deconstruct the savage slot.

2.4 OTHERING THROUGH TIME AND SPACE

Like Trouillot (1991) and Hall (1996), Johannes Fabian (2002) tackles the West’s creation and idea of the Other. Fabian (2002) examines representations of people through misconstrued ideas of Time by tracing the concept of linear time through history, especially through the Judeo-Christian tradition of Time and comparing it to the creation of secular Time. I have chosen to capitalize Time and Space following Johannes Fabian who does so to problematize this concept in relation to the “Other”. It also stands in as a proper referent denoting a group defined by radical cultural difference.

In the 18\textsuperscript{th} century there was a gradual shift from the use of biblical Time, based on earlier calculations of the age of the Earth by Archbishop James Ussher and Reverend John Lightfoot, to secular Time based on geological and evolutionary processes such as sedimentology and erosion and depositional rates (Murray-Wallace 1996). Ussher and Lightfoot used literal interpretations of Scriptures to calculate the age of the Earth to 6,000 years old in the 17\textsuperscript{th} century. Fabian (2002) writes that this shift in the way Europeans and Westerners thought
about Time, particularly regarding the age of the Earth, gave rise to a sense of deeper chronology.

In addition to these new geological and evolutionary ideas affecting people’s sense of Time, was a rise in modernist logic, or science, that directly influenced perspectives and perceptions of the world. Scientific travel and secular travel for knowledge came to replace religious travel in the 18th century (Fabian 2002:6). Of particular interest to traveling scientists and philosophers at this time was natural history or “…projects of observation, collection, and classification and description” (Fabian 2002:8). Fabian (2002) says one purpose of this scientific travel was to fill-in the history of man or to describe the customs and ways of life of new peoples. Such travelers were attempting to fill in “…spaces or slots in a table, or the marking of points in a system of coordinates in which all possible knowledge could be placed” (Fabian 2002:8). Naturally, anthropology has roots in such classificatory and descriptive studies as well as a foundation in Enlightenment thinking. This can be directly tied to Trouillot’s (1991) “Savage Slot” and to his discussion of the savage. Also related to this new form of travel, is the fact that the travel itself had a dramatic effect on concepts of Time and Space (Boyarin 1994; Fabian 2002). The length of Time it takes to reach a place directly impacts perceptions of how distant that place is, and consequently how distant its peoples are in Time and Space. In the 18th century (and before) travel by boat to a new continent, or to new lands and peoples, could take months. This simultaneously distanced the traveler (and readers of his subsequent travel or scientific writings) from the place and or people of study
through the physical distance traveled, but also through the length of Time
needed to travel.

Primitive people are viewed as out of Time and distant from "us". Fabian
(2002) writes that the Other, the primitive, is irreversibly linked to Time. He says,

A discourse employing terms such as primitive, savage (but also
tribal, traditional, Third World, or whatever euphemism is current)
does not think, or observe, or critically study, the “primitive”; it thinks,
observes, and studies in terms of the primitive. Primitive being
essentially a temporal concept, is a category, not an object, of
Western thought. (Fabian 2002: 17-18)

Thus when archaeologists and anthropologists refer to primitive people (or
whatever synonym is employed) they situate “them” on a timeline, specifically on
a plane where they are temporally and spatially distant from super powers,
“modern” peoples, or Westerners. The savage is then seen to live in another
Time—a Time apart.

This distancing can be seen in historical documents as well as in the
treatments and manipulations of the prehistoric record. Commonly African people
are presented in literature as being unable to develop new technologies on their
own, but must instead be influenced from the outside, typically by the
Enlightened West. Stahl argues that Africans are seen as stuck in Time and
distant from the modern world (Stahl 2007:49). Cobb (2005) also sees these
static pasts being imposed on non-Western groups, and uses the term
thermodynamics to describe one Western-centric view of the Other. He describes
a hot-cold relationship between the West and the rest, where the vibrant West
must interject its hot ideas and influences into the cold static culture of the Other
to beget any change (Cobb 2005:571). Cobb follows this line of thought further
saying the any technological transformations were credited to the outside influence of Western expansion (Cobb 2005). These misconceptions or inaccurate representations of Africans and Others have seeped into the prehistoric record, for Western perceptions are reproduced in literature, taught, and recycled for future publications.

2.5 SUMMARY

The aim of this chapter has been to examine the representations of Africa in the historic and prehistoric record and to question the presentation of the continent and its people as unchanging, traditional, and primitive, especially in light of behavioral modernity debate centered on the MSA. Attention has been given to the rise of anthropology as a discipline, and its preoccupation with the Other. Trouillot (1991), Fabian (2002), and Hall (1996) all discuss the Othering of non-Western peoples, tying this to the creation of the West itself, and ultimately to the creation of anthropology. Fabian (2002) demonstrates how the West has manipulated Time and situated the Other (the primitive, the traditional, the Third World, or other substitutions) as distant in both Time and Space. This distancing is easily seen in the manipulation and treatment of the prehistoric record.

McBrearty and Brooks (2000) and Stahl (2005) all express the idea that the African archeological record has been hijacked by Eurocentric ideas that paint Europe as technologically and behaviorally modern, and Africa as a cultural backwater, stagnant and unchanging. These Western notions are derived from the Standard View, an often reproduced master narrative that frames humanity on a single Timeline progressing from simple to complex (ex: savagery,
McBrearty and Brooks (2000) and Stahl (2005) describe these Eurocentric failings: (1) the European material record is conflated with and compared to the African record, and (2) European Time is mapped onto African Time, not only by utilizing the same or similar terminology to describe Time sequences (ages and stages), but by also expecting distinct continents and environments to progress along the same Timeline.

McBrearty and Brooks (2000) discussed how anatomically modern humans from the Africa MSA are often viewed through a Eurocentric lens, and are often seen as behaviorally stagnant and primitive. They are not accepted as fully human, and are often viewed as lacking indicators of modern human behavior. However, behavioral traits used as measures indicating modern human behavior are present in the African record, but such indicators are often deemed too rare or the context is questioned. McBrearty and Brooks (2000) argue that changes in technology and behavior took place gradually and did not arrive in a revolutionary package, as is often described for the European Middle to Upper Paleolithic transition (see Klein 2000; Mellars 1989).

One way this thesis hopes to dismantle notions of Africans in the archaeological record as primitive is by demonstrating that modern human behavior is indeed present in the MSA alongside anatomically modern humans. The MSA mudstone lithics from Birimi may offer clues that point to behavior modernity. The Birimi MSA lithic assemblage may indicate modern human
behavior in two ways: (1) through technological complexity, specifically through the presence of Levallois technology, and (2) through the presence of style, which has been argued to be an extension of symbolism, a criterion often used for indicating behavioral modernity.

The African record must be evaluated on its own terms using its own artifacts. It is irresponsible to link the African record with the European in the way described above. Western models and interpretations have held hostage the prehistoric record of Africa—it has been misrepresented as stagnant and primitive. McBrearty and Brooks (2000) as well as Stahl (2005), Casey (2005), and others have all attempted to highlight these myths and ill begotten illustrations. I hope to do the same. I am committed to answering Trouillot’s (1991) call to dismantle the savage slot and Cobb’s appeal to practice “…a deep historical anthropology that will continue to undermine stereotypes about the Other in the past as well as the present” (Cobb 2005: 563).
CHAPTER 3
THE MIDDLE STONE AGE ACROSS AFRICA

The MSA is an exciting time period to study from an evolutionary perspective. The oldest known fossils that represent the earliest members of the *Homo sapiens* lineage coincide with this time (McBrearty and Tryon 2006), as does the migration of anatomically modern humans around and out of Africa (Wurz 2013). In addition to the appearance of the fully modern *Homo sapiens* skeleton, modern human behavior also developed and coalesced during this compelling period. This chapter will offer an overview of the African MSA. It will demonstrate that the MSA is a period of behavioral and technological modernity and diversity.

The chapter opens with a discussion of the MSA in relation to the Paleolithic, broadly defining the MSA temporally and technologically. Then, typical problems researchers face when studying deep time will be addressed. Next, Levallois technology, a prepared core technique commonly found at MSA sites that was shown in the last chapter to be an important cognitive and technological development, will be explored and defined in detail. Following this in depth look at a typical lithic technology found across the MSA in time and space, will be a regional overview of the MSA. This regional overview will highlight important sites and finds and show how the MSA is incredibly diverse.
across Africa. It will also demonstrate that traits linked to modern human behavior appear at different times in different regions and that there are distinct regional styles of lithic artifacts in the MSA. And finally, attention will focus on Birimi, the site central to this thesis. A description of Birimi and its MSA artifacts will be given.

3.1 THE MIDDLE STONE AGE’S PLACE IN THE PALEOLITHIC

The MSA is an intermediary both technologically and chronologically between the Early Stone Age (ESA) and the Late Stone Age (LSA). Goodwin and van Riet Lowe (1929) formulated the categories known as the ESA, MSA, and LSA in 1929. Prior to Goodwin and van Riet Lowe’s terminology, researchers in African prehistory used the European sequence (the Lower Paleolithic, the Middle Paleolithic, and the Upper Paleolithic) (Stahl 2005: 7). The new terminology was meant to distinguish the African record from the European, but parallels were and are still drawn. This creates a multitude of problems including the expectation that technologies in each region progress along the same lines, and when the uncommonly studied African sequence is compared to the abundantly studied European sequence and they do not match, researchers commonly conclude that something is wrong or backwards with the African record (McBrearty and Brooks 2000; Stahl 2005).

Goodwin and van Riet Lowe’s stages were accepted by the Third PanAfrican Congress in 1955 (Clark 1957, xxxiii). A decade later, Grahame Clark
introduced five lithic modes as a way of dividing the lithic technologies of the different stages (Table 3.1) (Clark 1968).

Table 3.1 Clark’s Lithic Modes with Corresponding Periods, *fossils directeurs*, and Hominins

<table>
<thead>
<tr>
<th>Technological Mode</th>
<th>Industry and <em>fossils directeurs</em></th>
<th>Hominins¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode 1</td>
<td>Oldowan, ESA (choppers and flakes)</td>
<td>Earliest Homo (<em>Homo habilis, Homo rudolfensis</em>)</td>
</tr>
<tr>
<td>Mode 2</td>
<td>Acheulean, ESA (bifacial handaxes)</td>
<td><em>Homo ergaster, Homo erectus, and Homo heidelbergensis</em></td>
</tr>
<tr>
<td>Mode 3</td>
<td>Middle Paleolithic, MSA, (prepared cores, points)</td>
<td><em>Homo sapiens</em> in Africa; <em>Homo neanderthalensis</em> in Europe</td>
</tr>
<tr>
<td>Mode 4</td>
<td>Upper Paleolithic (retouched blades)</td>
<td><em>Homo sapiens</em> worldwide</td>
</tr>
<tr>
<td>Mode 5</td>
<td>Mesolithic and LSA (microlithic composite flakes and blades)</td>
<td><em>Homo sapiens</em> worldwide</td>
</tr>
</tbody>
</table>

Clark’s modes are still used as a conceptual framework for researchers to discuss technological trends, however many authors now take issue with them, primarily because the archaeological evidence does not fit neatly into such categories (Isaac 1982:168; McBrearty and Brooks 2000: 485). Some regions ¹Clark’s modes do not fit neatly with the archaeological record or with the fossil hominin record. This table approximately matches hominins with technologies, archaeological periods, and Clark’s modes.
retain a specific technology well into another mode, and some sites show evidence of more than one mode in the same time period. For example, Acheulean Mode 2 handaxes may be found associated with Mode 3 Levallois cores at some sites. However, Clark’s modes may be useful as a way of explaining the major technological differences found in the first versus the second half of the ESA.

The MSA is proceeded by and marks an end to the Early Stone Age (ESA). The ESA can be divided into two modes, each associated with distinct hominins and technologies, the first of which are Oldowan tools. Louis Leaky first discovered Oldowan tools in 1936 at Olduvai Gorge, Tanzania, and his wife, Mary Leaky, analyzed the lithics from Olduvai developing and publishing her own categorization system with several different Olduvai industries (Potts 1988; Schick and Toth 2006: 3). Oldowan choppers and flakes fall into Clark’s Mode 1. Oldowan tools are dated between 2.6 and 1.4 million years ago and are found in association with Homo habilis and Homo ergaster (Schick and Toth 2006:9). However, research has uncovered crude Oldowan tools with fossil hominids outside the genus Homo including robust Australopithecines and a more recent find, a gracile Australopithecine, A. garhi (Schick and Toth 2006:10). Australopithecus garhi has been found near Oldowan cores and flakes, and no other hominid remains have been found in the same sediments (Heinzelin et. al. 1999:627). However, Heinzelin and fellow researchers are careful to say that they could not positively identify the creator of the tools (Heinzelin et. al. 1999:627; Schick and Toth 2006: 10). Regardless of which early ancestor
created the Oldowan tools, the tools themselves would have offered a distinct adaptive advantage, for stones are much stronger than hominin teeth or nails and could have been used to cut through thick animal hides and smash bones for marrow.

The Acheulean industry, named for the St. Acheul site in France where the technology was first identified (Kooyman 2000:71), developed out of the Oldowan in the latter half of the ESA. The Acheulean may well be the most durable artifact tradition lasting for well over a million years from around 1.5 million until around 200,000 years ago (Phillipson 1993:33). It is also the most geographically widespread tradition, occurring right across Europe, Asia and Africa, with the earliest examples coming from East Africa. Acheulean stone assemblages are more refined than Oldowan technologies (Clark 2001; Isaac 1986; Phillipson 1993). While the Oldowan tradition consisted of multipurpose, heavy choppers, and expedient tools, Acheulean technology consists of several tool types including large pear-shaped handaxes, cleavers, scrapers and flakes (McBrearty and Tryon 2006; Rolland 1995:335). The Acheulean is marked as a Mode 2 form of technology by Clark (Clark 1977), and is associated with early forms of the genus Homo, typically Homo erectus, Homo ergaster, and Homo heidelbergensis, though Homo habilis was also present in the prehistoric record at this time (Gowlett 1986; Phillipson 1993; Willoughby 2007).

Goodwin and van Riet Lowe (1929) saw the MSA as an intermediary between the ESA Acheulean and the later LSA. It is generally accepted that the shift from the ESA to the MSA demonstrates a transition in technologies and
advancement in the hominin line. The MSA is seen as a transition technologically from handaxes and cleavers to a prepared core technique of stone working. Prepared core techniques are seen as behaviorally and cognitively complex, since the knapper must predetermine mentally the desired end product, and specially prepare the core, especially the platform, to attain the desired mental image (Schlanger 1996). This behavioral change from Acheulean technology to MSA technologies becomes particularly important in light of the simultaneous evolutionary change in the hominin line from *H. erectus* and contemporaries to *H. sapiens*. This differs from what happens in Europe at this time.

The Middle Paleolithic is a European time period that correlates temporally with the MSA in Africa. It is also viewed as an intermediary between an Acheulean lithic tradition and a later Upper Paleolithic technological diverse period. The Middle Paleolithic is considered to have begun around 300,000 years ago and ended between 60,000 and 30,000 years ago (Conard and Richter 2011:7; Gamble 1999:174). The appearance of *Homo neanderthalensis* and the rise of the Mousterian industry, a technology typically associated with Neanderthals coincides with this period (Gamble 1999; Kuhn 1995). Modern *Homo sapiens* are also present both in Europe and in Africa during the MSA/Middle Paleolithic. Paleoanthropologists have yet to uncover Neanderthal fossils in sub-Saharan Africa, leaving us with a stark difference in hominin players when contrasting the Middle Paleolithic and the MSA.

The Mousterian industry, a lithic tradition found throughout the Middle Paleolithic, has been defined various ways since its original prehistoric
classification by De Mortillet in 1867 and 1869 (Monnier 2006). Today, the
Mousterian industry may include uni- and bifacially worked stone tools, Levallois
components and points, retouched points, sidescrapers, denticulates, and
notched pieces (Kuhn 1995). The presence of prepared cores and flake tools
match Clark’s Mode 3, just as some MSA artifacts and technologies do, but Clark
(1977) says there are many variations. In fact, variability in Middle Paleolithic
assemblages led to the Bordes-Binford debate, in which Francois Bordes argued
that variability in Mousterian assemblages was stylistic and indicated Middle
Paleolithic culture groups, whereas Lewis Binford contended that the variability
was functional and indicative of different activities carried out by one or more
groups (Dibble and Rolland 1992; Dibble et al 2013; Monnier 2006). Dibble and
Rolland suggest that neither Bordes nor Binford took modification through use
into account, and the debate remains unresolved even today, partially due to
data and methods (Dibble and Rolland 1992). Studies on the Mousterian today
are closely tied to debates about behavioral modernity and anatomically modern
humans, for modern humans and Neanderthals overlapped geographically and
temporally (Kuhn 1995; Soressi 2005). They interacted and interbred, and one
may surmise, influenced each other (Vernot et al 2016). Studies of Neanderthal
behavior and technology can provide a point of comparison to anatomically
modern humans and their technologies.

There are commonalities between the Mousterian industry and lithic
traditions found in Africa at this time, such as the predominance of tools made on
flakes and the use of prepared core techniques like Levallois or the similar
discoid concept. However, the end of the Middle Paleolithic in Europe is marked by the disappearance and replacement of the Levallois concept with blade production (Conard and Richter 2011:7). Blade production arrives rather suddenly in Europe and is accompanied by a range of other Upper Paleolithic innovations, such as artworks, Venus figurines, microliths, jewelry, and engravings on bone or ivory (Klein 1995). A marked difference between the Middle Paleolithic of Europe and the African MSA then becomes the very early presence of blades, microliths, bone tools, and other symbolic artifacts in the MSA. Comparing these two distinct regions and times leads to failed expectations in the archaeological record, often negatively impacting African research and representation.

The beginning of the LSA marks the end of the MSA, but like the transition from the ESA to the MSA, the transition to the LSA is contentious. It does not parallel the Upper Paleolithic exactly. Temporally, the LSA begins at different times in different regions; some researchers suggest dates between 40,000-60,000 years ago as a beginning to the LSA, and some suggest a more recent beginning around 20,000 years ago (Ambrose 1998; Mitchell 2002). Technologically, no single lithic industry succeeded the MSA, but some common elements of the LSA lithics include: a proliferation of small flakes, standardized but unretouched bladelets, increased use of bipolar flaking, a general disappearance of the Levallois prepared core technique, and shifts in raw material usage to finer-grained rock types (Mitchell 2002:119). A wider variety of stone artifacts, bone tools, and sites in general are present during the LSA. An
increase in site visibility may also indicate an increase in population sizes. However, some of this artifact and site variety may be tied to preservation issues, especially when comparing the relatively recent LSA to the great time depths of the ESA and the MSA. The LSA encapsulates Clark’s Modes 4 and 5, proving their ill fit for the archaeological record as we now know it. And it may go without saying, that fully modern *Homo sapiens* are the hominin associated with LSA technologies.

### 3.2 COMMON PROBLEMS ENCOUNTERED IN MIDDLE STONE AGE STUDIES

The MSA has enormous potential to inform us about the very earliest fully modern humans, but there have been significant problems in researching the time period including poor preservation conditions, an unreliable chronological framework, and a paucity of completed fieldwork, especially in West and Central Africa (Basell 2010; MacDonald and Allsworth-Jones 1994; Nygaard and Talbot 1984; Soriano et al 2010). Most known sites are open-air surface finds almost entirely represented by stone tools (Quickert et al 2003), few have been concretely dated, and little has been published. The cave sites of Klasies River Mouth and Blombos Cave in South Africa are happy exceptions whose large, well preserved assemblages have been copiously described and examined in numerous publications (Henshilwood and Dubreuil 2012; Henshilwood and Marean 2003; Henshilwood et al 2002; Henshilwood and Sealey 1997; Mitchell 2002; Singer and Wymer 1982; Wurz 1999).
3.3 THE LEVALLOIS METHOD

The MSA naturally, due to its great time depth, has a multitude of lithic technologies, some that are generally present throughout the whole period both temporally and geographically, and some that are present on a smaller scale, suggesting distinct regional traditions. A common theme in MSA lithic technology is that knappers have moved from making core tools to making flake tools. Commonly found across time and space in the MSA is the application of prepared core technologies, like Levallois and disc-core. This section will highlight the widespread Levallois method.

*The Levallois Method:*

Levallois technology is a form of flintknapping typically associated with the Late and Middle Stone Ages of Africa and the Lower and Middle Paleolithic of Europe. The term “Levallois” originated from a quarry site in France in the northern Paris suburb of Levallois-Perret, and it was first thought to be a narrow technology type centered in western Europe, though its presence is now found to be widespread across Africa, Europe, and Asia (Dibble and Bar-Yosef 1995: ix; Rolland 1995: 334).

The Levallois technique is important to researchers for two main reasons. One, it is a widely used variable technology, both geographically and temporally, making it a very successful practice and one that may offer insight to widespread human behavior. And two, Levallois is thought to have important behavioral and cognitive implications in the story of human evolution. Levallois is a technique for
producing standardized flake blanks. Unlike other flake blank technologies that typically harvest flakes from cores opportunistically without a predetermined mental map, the Levallois technique calls for cores that are carefully prepared to insure that flakes will have a predetermined shape (Andrefsky 2005; Dibble and Bar-Yosef 1995; Phillipson 1993). The Levallois is considered to be an efficient technique for two main reasons: (1) it conserves raw material by maximizing the length of useable cutting edge, and (2) it standardizes flake shapes so they may be used for intended tasks (Dibble and Bar-Yosef 1995: x). The carefully shaped cores and standardized flakes make it relatively easy to recognize Levallois technique in the archaeological record.

However, experts do not agree on how to define Levallois. There is no agreement on what constitutes Levallois in terms of its morphological and technological characteristics (Sellet 1995). Levallois was at first only loosely defined as a general technological stage between the Acheulean handaxes and later developed blade tools (Chazan 1997: 723; Basell 2010:15). Victor Commont offered the first comprehensive definition of the Levallois technique in 1909 describing it as a method for obtaining flat flakes, often with facetted platforms, from prepared cores (Rolland 1995: 334).

Francois Bordes (1961) attempted a more detailed definition of Levallois. He recognized bifacially flaked “tortoise shell cores,” or cores that resembled tortoise shells both in their dome shape and in their flake scar pattern, as characteristic of the Levallois technique (Figure 3.1). He defined the Levallois method of flake production as the technique of shaping a core in order to
produce a predetermined flake shape. The method can be recognized by the presence of bifacially flaked 'tortoise shell cores'. Finally, in something of a tautology, he defined Levallois flakes as flakes that were knapped using Levallois technology. Others have attempted to define the Levallois technique, but it has been described better than defined (Rolland 1995: 334).

Bordes’ criteria were not very well defined, and have subsequently been revised by a collaborating group of technologists including Boëda, Pelegrin, Geneste, and Meignen who wrote a series of papers outlining the specific criteria to define and recognize the Levallois method. These criteria are succinctly summarized by Boëda (1995) and again by Chazan (1997). Using five points (see Figure 3.1 below), Chazan writes:

1. The volume of the piece to be worked is conceived as two surfaces that meet at a plane of intersection.
2. The two surfaces are hierarchically related, one being the platform face (usually the more convex of the two) and the other being the production face.
3. The production face is organized such that the morphology of products is predetermined. This predetermination is based on the management of lateral and distal convexities.
4. The fracture plane for the removal of predetermined flakes is subparallel to the plane of intersection between the two faces.
5. The striking platform is organized so as to allow the removal of the predetermined flakes from the production surface. This requires that the intersection of the striking platform surface and the flaking surface must be perpendicular to the flaking axis of the predetermined flakes. At the level of technique it is stated that the Levallois method is used only with a direct percussion hard hammer technique. (Chazan 1997: 724)

There are several recognized methods of Levallois reduction but the two most common are the linéal (also called préférentiel) method and the récurrent method. The linéal method (see Figure 3.2) allows for the removal of one flake at
a time, and the core must be reworked before the next flake can be removed, while the récurrent method (see Figure 3.3) allows for multiple flake removals before reconfiguration is necessary (Boëda 1995; Chazan 1997). It is possible to produce much larger flakes using the linéal method, but the récurrent method permits the rapid removal of several flakes at a time. In other words, the linéal method maximized the size of the flake, whereas the récurrent method maximized the number of detached flakes (Andrefsky 2005: 155). The reduction method chosen depended on the nature of the raw material as well as on the type of flake needed for the task at hand.

There is some variability within both the linéal and the récurrent method. Within the récurrent method, it is possible to find variability in the direction that flakes are removed from the prepared core. Boëda (1995: 58) lists these variable directions as unidirectional parallel, unidirectional convergent, bidirectional parallel, bidirectional divergent, and centripetal. An example of unidirectional parallel is found below (see Figure 3.4). Within the linéal method, Boëda describes shape variability in the predetermined flake blanks to be stuck from different cores. The three main shapes of linéal cores that must be maintained to extract different flake blank shapes include quadrangular, triangular, and oval (see Figure 3.5 below) (Boëda 1995:58). Overall, there can be great variability in the shape of a Levallois flake, but the technique used to produce it is largely uniform and can be summarized by the five criteria listed above. However, it is important to note that the principle of equifinality does apply to Levallois flakes. Baumler (1995), Dibble and Bar-Yosef (1995), and Sellet (1995), among others
caution that the best way to interpret and study the nature of Levallois is to focus on the process, rather than the end products or results. This is best accomplished by using a chaîne opératoire (reduction sequence) approach or a refitting study if possible. But the best way to recognize Levallois in the archaeological record is to identify diagnostic artifacts, especially Levallois cores.

Figure 3.1 The Criteria of the Levallois Method (taken from Chazan 1997: Figure 2).
Figure 3.2 The Linéal/Préférentiel Levallois Method. One flake is removed at a time. The core must be prepared again before a second removal can take place (taken from Boëda 1995: Figure 4.24).
Figure 3.3 The Récurrent Levallois Method. Several Levallois flakes are removed before the core’s surface must be prepared a second time (taken from Boëda 1995: Figure 4.25).
Figure 3.4 Levallois Core Prepared Using the Récurrent Method, with Predetermined Flakes Removed in a Unidirectional Parallel Manner (taken from Chazan 1997: Figure 6).

Figure 3.5 Linéal /Préférentiel Levallois Cores. A: Quadrangular; B: Triangular; C: Oval (taken from Boëda 1995: Figure 4.27).
3.4 VARIABILITY IN THE MSA: A REGIONAL VIEW

This section provides an overview of the MSA in Africa by region. Each region will be defined by its modern day boundaries. Important sites will be highlighted and common artifacts, technologies, and unique finds will be reviewed in order to depict the variability present in the MSA. Naturally, due to the sheer number of sites in Africa, only a sample of sites and artifacts will be addressed; this is especially true for the often-researched regions of North, East, and South Africa. Distinct regional lithic industries are also highlighted, which in turn indicate regional style. It is my hope that this section, along with this chapter as a whole, will offer the reader a sufficient picture of the African MSA.

North Africa:

North Africa is a region of Africa that lies north of the Sahara Desert and follows the Mediterranean coast. Typically, the countries or territories that make up this region include: Western Sahara, Morocco, Algeria, Tunisia, Libya, Egypt, Sudan, and South Sudan. Today, the region is very arid, but the paleoenvironmental record indicates that much of northern Africa was wetter with grassland and wooded grassland ecosystems during inter-glacial periods (Cancellieri and Lernia 2013: 143; Marean and Assefa 2005:107). It appears that North Africa’s climate shifted between wet stages and arid stages several time during the Pleistocene, and the wet stages correspond with favorable periods of habitation (Foley et al 2013; Marean and Assefa 2005:107).
Marean and Assefa suggest that the MSA was in place in North Africa by 230,000 years ago (Marean and Assefa 2005:107). The two main components of the MSA in this region are the Mousterian and Aterian industries. The Aterian and Mousterian industries offer a look at a regionally contained component of the MSA and demonstrate examples of technological variability. The naming and the description of the Aterian industry are closely married to the European Paleolithic. Researchers in northern Africa have traditionally used European terminology, specifically terms like the “Middle Paleolithic” and “Mousterian”, to portray African contexts. Early descriptions of the Aterian label it as “Mousterian” or as “Mousterian with tangs” or even as “a new and advanced facies of the Mousterian” (Scerri 2013: 112). The use of European Paleolithic terms, for an African industry(ies) is wrought with problems. One, it implies that the technologies are the same; two, it can lead to confusion and bias among researchers when they hear terminology associated with different regions describing different artifacts; and three, the Mousterian in Europe is associated with different hominids, Neanderthals, whereas in North Africa, no Neanderthals have been found as of yet (Dibble et al. 2013; Scerri 2013).

These two industries are found from Morocco to Egypt and as far south as the Sahel (Scerri 2013: 112). The Aterian is present from Marine Isotope Stage 6 (c. 191-130ka) to Marine Isotope Stage 3 (c. 57-29ka) (Scerri 2013: 2), though many authors are cautious of dates associated with the North African industries (see Bouzouggar and Barton 2012; Hawkins and Kleindienst 2001; and Scerri 2013). In general, definitions and descriptions of both industries are vague and
differ only slightly from each other. The Mousterian in North Africa is considered to have a high Levallois component and an abundance of lithic types that are similar to the contemporary industries of Western Europe. The primary artifact types include Mousterian points, scrapers, notches, denticulates, and burins, but no tanged points (Dibble et al. 2013). The Aterian industry also has a strong Levallois concentration with similar elements. Typically, it is composed of Levallois blades, endscrapers, some bifacial foliates, and a high proportion of tanged pieces (approximately 25%, though this has been disputed) (Bouzouggar and Barton 2012; Scerri 2013: 113-114). The major differences seem to be that the Aterian is strongly tied to a presence of tanged or stemmed points (Figure 3.6), and on a smaller scale, bifacial foliates (Dibble et al. 2013; Hawkins and Kleindienst 2001; Iovita 2011; Scerri 2013). Dibble et. al (2013) indicate that the two do not differ enough to suggest different industries or cultures, but instead may simply imply variants of the same culture. Scerri (2013) attempted to identify the Aterian without the presence of the tanged or stemmed pieces and found that this criterion alone should not be grounds for a separate industry.

What was the function of the tanged points and what does this mean for the human story? Some have claimed their tangs were used for hafting and are evidence for early composite tools used as projectile weapons, spears or arrows, and as such offer evidence for early modern human behavior (see discussions by Iovita 2011 and Scerri 2013). Composite tools are complex tools that consist of two or more parts, often made of different media. Making them requires a complex chain of actions, something that is not seen in early technologies and is
thought to indicate modern human behavior. Caton-Thompson (1946) argued the tanged points, as potential projectile weapons, were an environmental adaption to hunting in the open grassland or arid desert because the appearance of Aterian points correlated with dry phases. In order to address these research questions, Iovita (2011) studied the morphology of the tanged points. He found that the active wear and use present on the tools indicated that they had been resharpened along a long edge while in the haft, which is similar to tools employed as scrapers. Bouzouggar and Barton (2012) discuss preliminary use-wear studies that also concur with Iovita’s findings, concluding that tanged points were used for scrapping and butchery, but rarely as projectiles. However, it is possible the tangs were used in multiple ways, perhaps as projectiles and later for scraping. These questions still remain and add to the pressing need to undertake more MSA research.

North Africa has a rich record of MSA sites. One of the most famous sites is Haua Fteah, a cave site in western Libya excavated by Charles McBurney (Willoughby 2007:196). Haua Fteah has a long uninterrupted sequence beginning with a lithic industry called the pre-Aurignacian, a blade-dominated technology with prismatic cores reminiscent of the Upper Paleolithic, followed by the Mousterian (Marean and Assefa 2005:108). The pre-Aurignacian level has estimated dates of 80,000 and 65,000 years ago (Willoughby 2007:223). It is thought that Haua Fteah has parallels with industries in the Levant and the South African Cape, such as seafood exploitation, a blade industry, and hafted points, and McBurney suggests that the people of Haua Fteah influenced the origin of
the Aterian, for there are foliate bifaces and pieces with tangs present
(Willoughby 2007:226) These ties to other industries and places make Haua
Fteah notable, especially when looking for evidence of human migrations out of
Africa or connections between Asia and Africa.

Figure 3.6 Retouched Aterian artifacts (A, B: tanged pieces; C: bifacial
foliate; D, E, F scrapers) (adapted from Dibble et al 2013: Figure 3).

Another MSA/Middle Paleolithic site in North Africa is Taramsa 1 in Egypt.
This site is dated using optically stimulated luminescence to between 49,800 ±
12,200 and 80,400 ± 19,000 BP with a mean age of 55,000 years ago
(Vermeersch et al. 1998: 480-481). Taramsa 1 was occupied throughout the
Middle Paleolithic. Early Middle Paleolithic assemblages contain hand axes,
foliates, and Nubian points and flakes; mid-Middle Paleolithic assemblages lack
the foliates or hand axes, but continues to represent the Nubian productions; and
the Late Middle Paleolithic is characterized by a lack of Nubian Levallois
methods, though classic Levallois production and blade production are present (Willoughby 2007:200). Nubian points are part of a regional variant of the linéal/préférentiel Levallois method. The Nubian Complex is recognized by triangular/sub-triangular shaped cores that are characteristically prepped on the distal end of the core to create a steeply peaked triangular cross-section, which results in the Nubian Levallois point (Rose et al 2011). The Nubian Complex is temporally contained within Marine Isotope Stage 5 (MIS 5), and has been found in northern Sudan, throughout the middle and lower Nile Valley, the eastern Sahara, and the Red Sea hills (Rose et al 2011). Importantly, the Late Middle Paleolithic occupation of Taramsa has been associated with a burial of an anatomically modern human child (Vermeersch et al. 1998). This burial of the dead indicates symbolic modern human behavior.

Overall, the Aterian, Mousterian, and Nubian Industries of northern Africa demonstrate that the MSA is not homogenous in time and space. Similar elements and technologies may be present throughout, such as the Levallois technique, but unique types, like the tanged points, bifacial foliates, and Nubian points all indicate regional industries. The MSA of North Africa may well be linked to the MSA in other regions of Africa, or to the Levant, but undoubtedly true regional identities or ethnic cultures are present.

*East Africa:*

East Africa includes the countries of Tanzania, Kenya, Uganda, Ethiopia, Somalia, Djibouti, and Eritrea, though the area is not concretely defined, and
some researchers may include or omit other countries (Clark 1988: 238; Tryon and Faith 2013: 235). Environmental conditions in contemporary East Africa are very diverse with habitats ranging from arid, almost desert conditions, to grasslands, dense woodlands, lowland rainforests, and even montane forests (Marean and Assefa 2005:109).

It has only been since the 1990s that archaeologists have taken a sustained interest in the MSA in East Africa (Willoughby 1993; Willoughby 2007: 248) and since then numerous MSA sites have been documented. Unlike southern Africa's abundance of well-preserved cave sites, most of the MSA sites found in East Africa consist of irregularly distributed open-air sites (Tryon and Faith 2013: 235). The presence of volcanic ash in the region has led to applications of potassium-argon (K-Ar) and argon-argon ($^{40}\text{Ar}/^{39}\text{Ar}$) dating. In fact, this $^{40}\text{Ar}/^{39}\text{Ar}$ dating technique has yielded the oldest MSA dates. Presently, the oldest securely dated MSA site is located in Gademotta, Ethiopia at >276 kya (Morgan and Renne 2008; Tryon and Faith 2013: 236-237). The end of the MSA in East Africa is said to date to ~40,000 to 50,000 years ago at Enkapune ya Muto, Kenya and ~30,000 to 68,000 years ago at Mumba Rockshelter, Tanzania (Tryon and Faith 2013:237).

The MSA archaeological record of East Africa reveals variability in lithic artifacts and techniques as well as a presence of artifacts frequently associated with later ages and modern human behavior. A collection of five ESA-MSA transitional sites in the Kapthurin Formation, Kenya occur within and below a Bedded Tuff that has been dated at two units using $^{40}\text{Ar}/^{39}\text{Ar}$ dating to 235,000 ±
2,000 years old and to 284,000 ± 12,000 years old, with the latter providing a minimum age estimate for the underlying archaeological sites (Tyron and McBrearty 2002: 211). Early evidence of Levallois technology and blade technology is present alongside Acheulean, Sangoan, and Fauresmith artifacts (Tyron and McBrearty 2002). The Sangoan and Fauresmith are considered transitional industries from the ESA to the MSA. The Fauresmith is dated between 150,000 to 500,000 years ago in some locations and includes long, narrow flake blades, convergent points, and small, broad handaxes (McBrearty and Tryon 2006: 260; Mitchell 2002: 62-63; Wurz 2013: 306). The Sangoan is poorly dated and widespread geographically in Africa, and characteristically contains heavy-duty tools, core axes, MSA debitage, small scrapers, and pick-like artifacts (McBrearty and Tryon 2006: 260; Mitchell 2002: 63; Wurz 2013: 306). In this same Kapthurin Formation, more than seventy pieces of red ochre were found as were grinding stones that may have been used to process the ochre (Willoughby 2007:251).

At the open-air MSA site Loiyangalani in northern Tanzania finds like ostrich eggshell beads, bone tools, and ochre pencils all point to modern human behavior. Lithics at this site include scrapers, borers, bifaces, and disc and Levallois cores (Willoughby 2007:263). Another MSA site, a site in the Bouri Formation, Ethiopia has early evidence for symbolic and mortuary behavior, normally associated with modern humans (Tryon and Faith 2013). At this site, three hominin skulls dated to 154,000-167,000 years ago may offer evidence of mortuary practices (Clark et al 2003; Tryon and Faith 2013: 245). The skulls
appear to have been defleshed and present with cut marks, scrapping marks, and polishing marks.

This variability in artifacts and technologies in the East African MSA suggests important behavioral changes. Many of these artifacts (beads, ochre, grindstones, blades and other finds like bipolar cores and anvils) are characteristic of the LSA, but their early appearance in the MSA demonstrates that behavioral modernity was present earlier than previously thought.

South Africa:

Southern Africa is a region that typically includes the countries of Zambia, Zimbabwe, Botswana, Namibia, Lesotho, and South Africa (Willoughby 2007:279). However, some authors may omit Zambia and or include Swaziland and the southern half of Mozambique in their discussions of this region (Mitchell 2002:10). The environment of southern Africa today is very heterogeneous. It includes moist woodland, dry woodland savanna, desert, grassland, and forest biomes among others (see Mitchell 2002:15). The regional environments of the MSA may have differed and reconstruction of these past environments still requires work.

This region, South Africa in particular, has some of the most well-known and well-documented sites of the MSA, largely because of numerous well-preserved cave and rock shelter sites, stratified sites, adequate dating techniques, and an abundance of research interest. Some of these sites include the famous Blombos Cave and Klasies River sites, others include Sibudu Cave,
Border Cave, Die Kelders, among many others. The early MSA dates between 300,000 and 130,000 years ago (Wurz 2013: 307). The Florisbad site in South Africa is dated to 280,000 years ago, and is the earliest MSA site recorded without Acheulean transitional elements (Wurz 2013:306). The latest MSA site in this region is currently Strathalan Cave B in South Africa dated to between 29,000 and 22,000 years ago (Opperman 1996; Opperman and Heydenrych 1990). The MSA in this region expands a great length of time.

Archaeologically, southern Africa embodies some of the most diverse finds in the MSA. Lithics from this region range from transitional Acheulean finds, to Levallois prepared cores and flakes, to even microlithic technologies. Blades, retouched pieces, backed pieces, and points are all visible in the southern MSA (Mitchell 2002). The Still Bay and Howieson’s Poort industries, two of the most recognizable lithic industries of the whole MSA, are present in this region. These industries offer evidence for typologically and geographically distinct industries in the African MSA. They are also tied to the rise of modern human behavior because they reveal relatively advanced lithic technologies, and because they have been associated with artifacts linked to symbolic or abstract thought including worked bone, engraved ocher, and pierced shells (Archer et al 2016; Wadley 2007).

The Still Bay underlies the Howieson’s Poort with a hiatus of a few millennia separating the two phases temporally. Each technological phase was active for only a short time, approximately 10,000 thousand years each between 77,000 and 59,000 years ago (Soriano et al 2015), or if one were to exclude sites
with questionable dates, then the temporal range shrinks to around 5,000 years each (Archer et al 2016: 58). Geographically, the Still Bay and Howieson’s Poort Industries are typically found in cave sites around southern Africa, some of these locations include the well documented sites of Blombos Cave, Border Cave, Klasies River Caves, Sibudu Cave, Rose Cottage Cave, and Pinnacle Point among others.

In 1929 Goodwin and van Riet Lowe defined the Still Bay by a presence of bifacial lance heads, or bifacially worked foliate or lanceolate points with invasive retouch and symmetry (Wadley 2007: 681). These points include a variety of shapes, but most common are laurel and willow leaf forms, triangular MSA points, and oak leaf forms, which are serrated or denticulated (Figure 3.7) (Willoughby 2007: 52). Still Bay points often exhibit hafting and resharpening, but rarely contain impact fractures (Minichillo 2005). Two main functions of these bifacial points are recognized. The primary purpose was use as knives and the secondary function is use as spear armatures. (Minichillo 2005:132; Wadley 2007). Wadley (2007) largely agrees with this assessment of the Still Bay points, but she cautions that residue and use-trace analysis of the Still Bay bifacial points of Sibudu Cave indicate that they were used as pointed hunting weapons (Wadely 2007: 686). The bifacial foliates were potentially multi-use tools. Still Bay bifacial foliates are also significant because some of the points have been heat-treated and finished with pressure flaking (Mourre et al 2010). Pressure flaking is an advanced and complex technology often associated LSA and Upper Paleolithic innovation. Still Bay bifacial foliates are also associated with many
other artifacts including bone points, engraved ochre, and backed pieces, which are pieces that have been blunted through grinding or dulling on at least one edge to prevent the artifact from cutting the hand or surface that edge comes in contact with (Andrefsky 2005: 253).

Figure 3.7 Examples of Still Bay Bifacial Points from Blombos Cave, South Africa (taken from Soriano et al 2015: Figure 9).
Overlaying the Still Bay in southern Africa is the Howieson’s Poort Industry. Spatially, the Howieson’s Poort Industry is found across South Africa, Namibia, and may be present in Zimbabwe (Mitchell 2002: 88). The Howieson’s Poort is present in between MSA levels at many sites in the South Africa region including Klasies River sites, Border Cave, Rose Cottage Cave, Apollo 11 Cave, and potentially at Die Kelders; it is present above MSA levels at Nelson Bay Cave and the Cave of Hearths, and below MSA levels at Montagu Cave and some sites in Lesotho (Thackeray 1992: 387; Willoughby 2007:281). It is found in the record as early as 80,000 years ago and appears to have ended by about 60,000 years ago (Mitchell 2002; Wadley 2008). The core-reduction method used for the Howieson’s Poort industry was a punch technique, primarily used for blade production, which is significant because it is not the commonly visible Levallois technique, but rather an example of core reduction that is not typically seen until the LSA or Upper Paleolithic (Mitchell 2002). Characteristics of the Howieson’s Poort industry include the selection of a fine-grained raw material, a blade component, and backed tools that are blunted to about a 90 degree angle, leaving one side sharp (Mitchell 2002; Wadley 2008: 122). This industry also includes a heavy presence of geometric segments and a less frequent presence of trapeze-shaped tools. Segments, sometimes called crescents or lunates, are backed geometric tools that are defined by Janette Deacon in Wadley (2008) as “a portion of a circle with a curved back shaped by abrupt retouch and a straight, sharp cord” (Wadley 2008:122). Trapezes are described as similar geometric backed pieces, but are more angular than their segment counterparts (Wadley
2008:122). These segments are often compared to composite tool segments from the LSA (Figure 3.8). In fact, they are thought by some researchers to have functioned as inserts for composite projectile weapons such as spearheads, arrowheads, and/or darts (Wadley 2008; Wurz 2013) potentially pushing back the use of stone-tipped projectiles to at least the end of the Howieson’s Poort at 60,000 years ago.

Figure 3.8 Examples of Howieson’s Poort Segments from Sibudu Cave, South Africa (taken from Wadley 2008: Figure 4).
Still Bay and Howieson’s Poort push the limits of what researchers could previously say about the behavior and competency of stone workers in the MSA, with early evidence of pressure flaking, microliths and, possibly, with evidence for retouched MSA points that may have been used as darts earlier than 60,000 years ago (Brooks et al 2006). This becomes particularly important in light of negative comparisons often made between Europe’s technologically ‘advanced’ Paleolithic and Africa’s ‘primitive’ Stone Age.

Although stone makes up the majority of MSA artifacts, several organic materials have survived in this South African region. One unique find is a wood throwing stick constructed from non-local wood from the Florisbad site in South Africa dating to between 259,000 and 125,000 years ago (Bamford and Henderson 2003; Mitchell 2002:89). Other organic artifacts include bone points and bone tools. One bone point was found at Kabwe, Zambia and one at Shelter 1A at Klasies River, South Africa, however, a clear MSA association for both finds has been questioned by some (McBrearty and Brooks 2000:504). Other worked bone was found at Blombos Cave, South Africa and includes two bone points, two awls, a flat piece with parallel incisions and sixteen other pieces (Henshilwood and Sealy 1997; McBrearty and Brooks 2000:506).

Human remains have been uncovered at several MSA sites in this region. Modern human remains, a partial cranium, two mandibles, some post-cranial bones, and a nearly complete infant skeleton, have been uncovered from Border Cave, South Africa and may be associated with the MSA (McBrearty and Brooks 2000:520; Mitchell 2002:75). The infant skeleton is interpreted as a deliberate
burial, and estimated to be 90,000-100,000 years old (McBrearty and Brooks 2000:520). Modern human remains are also present at Klasies River, South Africa. The human remains are fragmentary, have evidence of cut marks and burning, and may represent evidence for cannibalism (McBrearty and Brooks 2000:520; Mitchell 2002:74).

Beads and ornaments have long been linked to modern human behavior and were previously assumed to be absent from the MSA. However, it is now clear that such traditions are present at numerous sites in the MSA. This includes beads at the Cave of Hearths and Boomplas in South Africa and a perforated Conus shell associated with the infant burial at Border Cave among other finds (McBrearty and Brooks 2000:521-522). Other symbolic finds include a piece of ochre with incised cross-hatching, a notched piece of ochre, and an incised bone from Blombos Cave, South Africa (Henshilwood and Sealey 1997; McBrearty and Brooks 2000:523). Painted slabs from the Apollo 11 Cave in Namibia have been dated to between 26,000 and 28,000 years ago and are associated with the MSA (McBrearty and Brooks 2000:525-526; Willoughby 2007:299).

The Southern Africa MSA, with its long continuation, its abundantly rich mosaic of artifacts, and its well documented, well preserved, and research rich sites, is in a unique position to answer questions about modern human behavior and the human trajectory.
Central Africa:

Archaeologically, Central Africa consists of eleven countries including: Democratic Republic of the Congo, Cameroon, southern Chad, the Central African Republic, Equatorial Guinea, Gabon, Congo, Rwanda, Burundi, Angola, and sometimes northern Zambia (De Maret 2014). The Congo River is the second largest river in the world by discharge, and together with its basin and tributaries extend throughout Central Africa (Willoughby 2007: 274). The environment of Central Africa today primarily consists of rain forest that is “…bounded on both south and north by mosaics of evergreen forest, savanna, and southern lowland savanna, to the east by mountain forest and to the west by the Atlantic coast” (Cornelissen 2002:197).

The archaeology of Central Africa is greatly understudied and underrepresented in literature. This is partially due to environmental factors surrounding the difficulties working in a rain forest environment, for one-third of Central Africa is covered in this tropical vegetation (De Maret 2014). Rainforests have dense vegetation with thick littermats making visibility difficult. They are also humid leading to poor site and artifact preservation. Other factors influencing a paucity of research in Central Africa include insignificant or dilapidated infrastructure, political instability, and enduring civil wars (De Maret 2014). Despite these challenges, researchers have pursued studies of the MSA in the region.

The MSA archaeological record of Central Africa includes several lithic varieties. There are Sangoan and Lupemban elements present at some sites.
Both of these complexes have a heavy-duty component with the Sangoan often considered a transitional phase between the ESA and the MSA that precedes the Lupemban. The Lupemban differs from the Sangoan in that it is smaller and more refined; it is also typically recognized as containing foliate and lanceolate bifaces (Casey 2000:15; Willoughby 2007: 274). The Lupemban may have slowly morphed into an intermediate “Lupembo-Tshitolian” culture towards the end of the MSA in Central Africa (Taylor 2014). This intermediary proceeds an LSA Tshitolian regional industry characterized by microlithic technologies. The “Lupembo-Tshitolian” is younger than 25,000 years, and contains small foliate points, core axes, backed pieces, and tranchets (Taylor 2014:1212).

An example of a Central African site with Lupemban affinities is the open-air site of Mosumu, located in Equatorial Guinea in the Monte Alen National Park (Mercader and Marti 1999; Mercader et al. 2002). This is a multi-component site with MSA and LSA artifacts. The MSA components date to between 20,000 and 30,000 years ago (Mercader et al 2002:77). Tools include small lanceolates, core axes, large bifacial scraper, perforators, side scrapers, core scrapers, and small chopper (Mercader and Marti 2003: 71, 78) Lupemban affinities are present with bifacial technologies and pressure flaking on spear points (Mercader and Marti 1999:19).

Other lithic varieties are present at Kamoa, a site in the southern Congo. Kombewa or Janus flakes with bulbs on both surfaces are present alongside Victoria West Cores and flakes for bifacial cleavers, which are thought of as an evolved or final Acheulean (Willoughby 2007: 275). Victoria West lithics have
long been tied to the Acheulean in South Africa, and are considered a prepared core technology (Sharon and Beaumont 2006). Similar to the Levallois technique, Victoria West cores are prepared and struck to remove a single, large flake. This blank is then used for bifacial tool production in many South African Acheulean sites (Sharon and Beaumont 2006). Levallois flakes and cores are also present at sites throughout Central Africa.

Several important finds for the African MSA come from a Central African locality called Katanda, which is a series of terraces that run parallel to the Semliki River in the Democratic Republic of the Congo (Marean and Assefa 2005:110-111; Willoughby 2007: 276). The MSA occurrences at the Katanda sites are estimated to be 90,000 years old (Yellen et al 1995). Barbed and unbarbed bone points have been uncovered in association with fish, primarily catfish, remains at the Katanda sites (Yellen et al 1995). These artifacts indicate complex subsistence specialization and advanced technology, all pointing to behavioral modernity quite early in the archaeological record of Africa.

More research will help answer question surrounding Central Africa's place in the MSA and its role in modern human evolution. Significant behavioral questions being pursued include: when did hominins begin to occupy the rainforests and did this environment affect modern human behavior?

**West Africa:**

West Africa typically consists of fifteen countries including: Mauritania, Mali, Senegal, Gambia, Benin, Burkina Faso, Guinea, Guinea-Bissau, Ivory
Coast, Liberia, Niger, Nigeria, Sierra Leone, Togo, and Ghana, though the small island countries of Cape Verde, Saint Helena, and São Tomé and Príncipe may be included. The environment and vegetation of West Africa today is very diverse. The Sahara Desert and Sahel are in the north, followed by savanna, semi-deciduous forests, and moist evergreen forests in the south (Casey 2003:37-38). However, the environment during the MSA likely differed. The paleoenvironment of this region in the past is known to have alternating arid and humid phases that loosely correspond with glacial cycles. Arid phases led to expanding deserts, whereas humid phases are associated with forest expansion and a lush inhabitable environment in what is now the Sahara (Casey 2003:39). Although these large-scale trends may be discussed, small-scale changes are more nuanced and require more study.

In West Africa there are large gaps of knowledge surrounding the MSA. The reasons for the gaps in West Africa mirror the research problems faced by the continent as a whole, namely poor preservation conditions, an unreliable chronological framework, a paucity of fieldwork, and few researchers. However, cultural and geographical barriers also contribute to the lack of information on West Africa's prehistory. Casey (2000) highlights the fact that in West Africa researchers typically concentrate on historic archaeology linking the more recent past to heritage and identity. The geography of the region also complicates dating abilities making a study of deep time problematic. The region lacks volcanic activity and thus potassium-argon dating is unavailable, and the MSA in general is beyond the limits of radiocarbon dating (Casey 2000:14). Although there is a
limited range of applicable dating methods, conditions in West Africa have been favorable for optically stimulated luminescence (OSL) dating, especially where sediments are mainly formed of quartz sand which produce a strong luminescence signal (Liritzis et al 2013; Tribolo et al 2015).

One of the most prolific researchers of West African prehistory is Oliver Davies. He completed extensive surveys and excavations throughout Ghana and into parts of Togo and Nigeria (Davies 1967). However, his research interpretations have been called into question and in part reanalyzed (Allsworth-Jones 1981; Nygaard and Talbot 1984; Casey 2000; 2003), for some of his classifications were undiagnostic and poorly dated and stratified. Most of the materials Davies collected were ambiguous surface collections. Like the greater MSA, the MSA in West Africa is a long time span with long retentions of the same technologies. Davies reported the appearance of MSA materials that demonstrate Sangoan or Lupemban affinities with heavy-duty components and bifaces (Casey 2003; Davies 1967; Nygaard and Talbot 1984). The terms Davies used, Sangoan and Lupemban, were generalized and may not actually represent Sangoan and Lupemban industries. McBrearty and Brooks (2000) state that when the Sangoan is found in context, it typically overlies the Acheulean and underlies the MSA, which would give it a tentative date of 300,000 to 250,000. The Lupemban, “…characterized by light-duty tools such as small, retouched tools and scrapers, heavy-duty tools such as picks and core-axes, and large cutting tools such as hand axes and lanceolate points…” generally follows the Sangoan (Casey 2003:44). Sometime after the Sangoan, Levallois lithics started
appearing in the record of West Africa. Unfortunately, dates for this appearance are inconsistent and are tied to regional dating problems for the MSA.

In addition to Davies' extensive work is more site-specific research around West Africa. Many sites in this area were first found as a result of mining activities, and are subsequently less than ideal. Allsworth-Jones describes some of these sites in a review chapter of the Stone Age in Nigeria and Cameroon (Allsworth-Jones 1986: 153-168). He includes a description of sites in Nigeria he found while investigating the MSA from 1976-1978, the majority of which are found between Jos and Kano (Allsworth-Jones 1986: 155). He provides statistical data for three sites in Nigeria, broadly outlining their archaeological content. These three sites are Mai Lumba, Tibchi, and Zenabi, and may be useful as comparisons to Birimi. Levallois cores, flakes, blades, and points were found, as were disc cores, and a variety of tools including sidescrapers, endscrapers, burins, notches, denticulates, and bifaces (Allsworth-Jones 1986: 160). Allsworth-Jones (1986) relates this material to sites in Cameroun and North Africa in an attempt to recognize trends in the MSA and in the region, though further work may be needed to accomplish this.

In addition to Birimi, a few other sites have been reported for the MSA in Ghana. Birimi will be discussed in depth in the next section. Tema II, dated to between 20,000 and 25,000 years old, and Asokrochona, dated to between 13,000 and 20,000 years old, are sites near the coast in Ghana that both have Sangoan elements (Quickert et al. 2003:1292; Willoughby 2007:271). At Asokrochona this MSA layer overlies Acheulean materials and underlies meso-
neolithic ones. Nygaard and Talbot (1984) offer a broad overview of the artifacts found out these sites. Tools include scrapers, knives, notches, picks, core axes, choppers, denticulates, and bifaces. Some bipolar cores and discoidal cores are present, though the majority of the cores seem to be formless. Very few flakes have been classified as Levallois, and no Levallois cores have been found (Nygaard and Talbot 1984: 30,32). It has been reported that the MSA of Ghana is more like the Middle Paleolithic of northern Africa than industries elsewhere (MacDonald 1997:332); this is similar to Allsworth-Jones’ (1986) conclusions for the MSA in Nigeria.

A complex of open-air sites at Ounjougou on the Bandiagara plateau in the Dogon country of Mali offers one of the most significant locations where MSA research is being carried out in West Africa (Willoughby 2007:271). A research team led by Eric Huysecom has reported surface finds in addition to some stratified artifacts with the oldest MSA occupations occurring about 150,000 years ago and a more numerous concentration occurring between 80,000 and 25,000 years ago (Soriano et al 2010). The majority of lithic artifacts from Ounjougou were produced from quartz and quartzitic sandstone raw materials; this affected their quality. Levallois and discoidal elements as well as blades and bifacial foliates are present. Interestingly, bipolar debitage and large, heavy scrapers are found in similar stratigraphic positions, however, have yet to be directly associated except on the surface (Soriano et al 2010: 8).

Recent research in Senegal also offers a greater understanding of the West African MSA. The Tiemassas site, located about 100 km from Dakar, is
characterized by artifacts with high typological diversity (Niang and Ndiaye 2016). Presently, there are no chronometric dates for the site, but geomorphological and contextual interpretations offer a probable date range of 200,000-20,000 years ago. The wide range of artifact types present have led researchers to link the site to different periods including the Middle Paleolithic, the Upper Paleolithic, the Mesolithic, and the Neolithic (Niang and Ndiaye 2016:6). Considerable MSA material seems to be mixed with artifacts from later periods suggesting that Tiemassass was important and occupied throughout prehistory. Lithic artifacts types include side-scrapers, end-scrapers, bifacial armatures, points, tanged points, denticulates, notches, blades, and Levallois products, and Kombewa flakes. The tanged points may indicate a link to the North African Aterian. Reduction strategies at Tiemassas varied. Opportunistic strategies were employed, as were Levallois, Discoidal, core-on-flake, and some marginal laminar techniques. A façonnage or shaping strategy was also found to be present. Niang and Ndiaye (2016) found that the large variability in strategies may be linked to raw material shape and dimensions. This site, along with other mentioned sites, indicates a long timespan for the MSA in West Africa. Variability within the MSA of West Africa is increasingly evident.

A summary of this regional discussion of the MSA in Africa is offered in Table 3.2 with regional dates and general artifacts marked.
Table 3.2 Regional Comparison of the African MSA (McBrearty and Brooks 2000; Mitchell 2002; Taylor 2014; Willoughby 2007).

<table>
<thead>
<tr>
<th></th>
<th>West Africa</th>
<th>Central Africa</th>
<th>North Africa</th>
<th>East Africa</th>
<th>South Africa</th>
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<tbody>
<tr>
<td><strong>Dates</strong></td>
<td>Not Concretely dated (≠300-13kya)</td>
<td>Not Concretely dated (≠300-13kya)</td>
<td>230kya-?</td>
<td>&gt;276-40kya</td>
<td>300-22kya</td>
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<td>(a) Lithics</td>
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<td>Sangoan</td>
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<td>(Heavy-duty: Picks, Core Axes, Choppers, Core Scrapers)</td>
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<td>Lupemban</td>
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<tr>
<td>(Large Foliate Points, Core Axes, Small Points, Blades)</td>
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<td>Lupemban-Tshitolian</td>
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<tr>
<td>(Foliate points, Core Axes, Backed Pieces, Tranchets)</td>
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<td>Aterian/Mousterian</td>
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<td>(Levallois Component, Tanged Points, Bifical Foliates)</td>
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<td>Still Bay</td>
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<td>Howieson's Poort</td>
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<td>(Heat Treated, Pressure Flaked, Etc.)</td>
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<td>(b) Other Artifacts</td>
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<td>Bone Tools</td>
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<td>beads</td>
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<td>Ochre</td>
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<td>Wood Throwing Stick</td>
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<td>(c) Human Skeletal Remains</td>
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<td>Burial</td>
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<td>Cut Remains</td>
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3.5 THE MIDDLE STONE AGE SITE OF BIRIMI, GHANA

Birimi is located in Ghana’s northern region, 3km south of the edge of the Gambaga Escarpment (Figure 3.9) (Hawkins et al 2001: 278). Birimi was discovered during archaeological investigations in the area in 1988 (Casey 2000), and was excavated in 1996 and 1997. Birimi is a multi-component site with at least three occupations including the MSA (ca. 30,000-40,000 B.P.), LSA Kintampo Complex (2,500-4,000 B.P.) and Iron Age (1,000-1,500 B.P.) (Casey 2003; Casey et al 1997; Hawkins et al. 1996; Hawkins et al 2001; Quickert et al 2003). The latter two occupations are outside the scope of this thesis and will not be investigated. The MSA dates have been confirmed using optically stimulated luminescence (OSL) for several in situ artifacts. Birimi was a perfect contender for OSL dating because OSL is more accurate when applied to quartz-rich sediments and those at Birimi are derived from the sandstone of the escarpment itself (Quickert et al 2003). A date of 40,000 ± 11,800 years ago is associated with a mudstone blade with a faceted platform 113 cm below the surface, and at another locality quartz grains yielded a date of 23,600 ± 2,900 years ago for MSA bearing sediments associated with patinated MSA flakes 105 cm below the surface (Quickert et al 2003:1295). The MSA artifacts underlie a Kintampo horizon at both locations, though at different depths (~1 meter versus ~0.5 meters). It was not possible to trace the MSA horizon laterally between the two artifact occurrences, and it is possible that they represent two distinct occupations (Quickert et al 2003: 1296).
Figure 3.9 Map of Birimi’s Location (taken from Casey et al 1997: Figure 1).

MSA artifacts are found in several different locations at Birimi. The majority were found on the surface of the terrace, several pieces were found in situ approximately one meter below the surface, some were found in mixed contexts with Kintampo artifacts possibly due to Kintampo people’s predisposition for digging or simply living in the same area, and still others were found redeposited
at the bottom of gullies either washed off the top of the embankment or eroded out of the side of the gully walls (Hawkins et al 2001: 280).

Where the MSA and Kintampo materials occur together, the two technologies are easily distinguished from each other by three main criteria (Hawkins et al 2001: 283). First, while both technologies are made on siliceous mudstone, a chert-like material, the MSA materials are yellowish brown in color, while the Kintampo materials are grey-blue. The difference in color is due to weathering, with the MSA materials being much more heavily patinated than the Kintampo materials. Instrumental Neutron Activation Analysis of the raw material indicates that all colors of siliceous mudstone at the site came from the same geological beds (Hawkins et al 2001). The siliceous mudstone is mined today for flints for flintlock guns and strike-a-lights that are available in local markets. While mudstone outcrops are frequent in the area, most produce soft, friable and unsilicified mudstone and interviews with people who make, sell and use flints indicated that they know of only one source for high quality material, about 25 kilometers from the Birimi site (Hawkins et al 2001: 284). When samples taken from the source were compared to mudstone artifacts from Birimi, they matched. If there were other outcrops of this material in the vicinity, it is likely that people who make their living from the production of flints would know about them. Although we cannot exclude the possibility that geological processes may have exposed other sources of the material during MSA times, it is most likely that this is the source of their lithic raw material.
A second way that the two industries can be distinguished is by their technologies. During the MSA people used freehand percussion to produce flakes with characteristic features such as striking platforms, bulbs of percussion and intact margins and terminations. The Kintampo people primarily used bipolar percussion that produces few intact flakes, but many battered and broken pieces.

The third way to distinguish the two industries is by flake size. MSA materials are much larger than Kintampo ones. Not only is freehand percussion capable of producing larger flakes than bipolar, but MSA people were clearly interested in producing larger flakes. Although the MSA lithics are larger than the LSA lithics, there is potentially some sampling bias. Smaller MSA flakes may have been harder to see due to their size and brown color, whereas the LSA artifacts may have stood out more with their lighter grey-blue hues. However, larger flakes of either period should be easier to see and recover, but there were hardly any large LSA flakes recovered.

The MSA artifacts are larger than the LSA in almost all measurements, and the easiest way to demonstrate this size difference is by weight comparison. I performed a preliminary analysis to determine whether this pattern was accurate. Figure 3.10 below shows the results of the preliminary analysis of 93 MSA and 97 LSA pieces of flaking debris, determined by the color of the raw material, forming completely separate clusters based on size. The largest concentration of MSA artifacts weigh more than 10 grams and the largest concentration of LSA artifacts weigh 1 gram or less. The LSA sample was randomly selected and weighed in the lab by an undergraduate student, Noah.
Atchley, who was studying the LSA lithic component of Birimi. And I randomly selected the MSA sample from the recovered Birimi artifacts and measured them using the same scale.

A large amount of chipped quartz was also found at Birimi. Quartz does not occur naturally at the top of the escarpment, so it is clear that all quartz at the site exists because humans brought it there. Although the use of quartz is not unknown during the MSA (Soriano et al. 2010), and the MSA people could have used some of the chipped quartz at Birimi, the quartz is more likely to relate to the Kintampo component of the site. The quartz is very difficult to analyze because it fractures unevenly into small chunks. Chipped quartz is characteristic of Kintampo sites and it occurs in profusion in sites where there is no MSA component. At Birimi the quartz is much more consistent with the way that the

![Figure 3.10 Weight Comparison of LSA and MSA Artifacts Demonstrating that the Two Occupations Can be Distinguished by Size Distribution](image)
Kintampo people used lithic raw material by knapping it using bipolar technique and selecting small, sharp pieces for expedient purposes.

A few observations can be made at this time about the MSA assemblage. It appears that freehand percussion was used to produce the artifacts. Artifacts include informal, amorphous cores, Levallois flakes, blades, bifaces, notches, denticulates, and retouched flakes and blades. The artifacts also point to a Levallois or Levallois-like reduction sequence. The MSA at Birimi does not resemble the heavy-duty component of the Sangoan (Casey et al. 1997), but two bifacially flaked lanceolate points are reminiscent of the Lupemban. A further description of the assemblage and technology will be presented in Chapter 5.

I also met with Dr. Alicia Hawkins from Laurentian University. Dr. Hawkins is a lithic expert who specializes in the MSA and the Aterian industry, of which Levallois artifacts are common. It was Dr. Hawkins who first recognized the MSA component of Birimi and from what she has seen of the Birimi MSA assemblage, she believes that a Levallois-like technology is present, but is hesitant thus far to attribute the technology directly to Levallois (personal communication with Hawkins, October 25, 2011).

In West Africa, there is a lack of regional framework discussing lithic variability in the MSA, so it is difficult to contextualize the Birimi assemblage in terms of regional concerns and the greater MSA. It is clear that more primary data needs to be collected, described, and compared in this region. Chapter 5 will address this further.
3.6 SUMMARY

The African MSA is a long time period with many differences archaeologically across time and space. This chapter has discussed where the MSA fits in the Paleolithic record, namely before the LSA and after the ESA. The MSA is an exciting time in evolutionary history, for the first anatomically modern humans appeared during this age as did modern human behavior. Symbolic behaviors or artifacts like mortuary practices, ochre, beads and ornaments, and advanced technologies like pressure flaking, blades, composite tools substantiate this claim. Common problems researchers face when studying the MSA were outlined. MSA lithic technologies were described with attention given to Levallois technology, which is a prepared core technique seen throughout the MSA in every region. More regional differences and cultural styles of lithics were also explored, represented by the Aterian and Mousterian industries of North Africa and the famed Still Bay and Howieson’s Poort of southern Africa among others. Some examples of prominent sites were offered for each region of Africa, and broad overviews of the artifacts present were discussed. Finally, attention was given to the Birimi site of Northern Ghana, the central focus of this thesis.
CHAPTER 4

ANALYTICAL METHODS

Lithic debitage, defined as flake and debris by-products produced during the manufacturing and maintenance of stone tools, coupled with stone tools themselves are arguably the most common artifacts found at prehistoric sites due to both their durability and the immense timespan over which they were made (Andrefsky 2001, 2005; Debénath and Dibble 1994). Undoubtedly the lives of Stone Age people were full of other useful and transformative materials like animal based products such as bones, shells, sinew, hides or furs and plant based products like wood and resin. Unfortunately, researchers hoping to understand MSA cultures are only left with residual cultural evidence, and often, lithics are the only surviving artifacts recovered from MSA sites. Lithic analysis is therefore an important tool for researchers hoping to answer questions about prehistoric capabilities, technologies, activity and land-use patterns, social organization and other lifeways.

Given the potential lithic analysis has to unlocking the past, this thesis will utilize the MSA Birimi debitage and lithic assemblage to address the questions outlined in Chapter 1, namely: (1) What is the nature of the MSA assemblage of Birimi?; (2) Does this assemblage reveal modern human behavior, and if so, how?; and (3) How does the MSA of Birimi compare to the greater MSA of Africa and to the MSA of West Africa in particular? In order to best answer these
questions, it was determined that a macroscopic analytical approach should be applied to the Birimi assemblage.

This chapter will discuss three common methods used in macroscopic lithic debitage analysis, highlighting the benefits and drawbacks to each, then it will offer an explanation of the analytical methods used in this study, and finally, it will provide a detailed description of how the Birimi assemblage is going to be analyzed. This detailed description will clearly define attributes and terminology in order to foster accurate intersite comparability or replicable analysis.

4.1 DEBITAGE ANALYSIS

There are numerous approaches to lithic debitage analysis, but the type of lithic analysis an analyst adopts for a specific assemblage should be driven by the questions the researcher is asking. This means that the researcher should carefully outline the research question or questions set and select the analytical method or style that will best answer the query. This chapter reviews three of the most common methods of analyzing lithic debitage, all of which were considered for the Birimi assemblage: (1) flake attribute analysis; (2) typological analysis; and (3) aggregate analysis. The first two approaches are accomplished by analyzing each individual flake or specimen in a sample, known as Individual Flake Analysis (IFA), whereas the third approach is accomplished by processing large quantities of flakes concurrently, known as aggregate analysis or sometimes as Mass Analysis (MA). In this section, each of these three methods
will be described and their respective strengths and weaknesses will be considered.

*Flake Attribute Analysis:*

Flake attribute analysis is the recording and examination of select debitage attributes across an entire population (Andrefsky 2001). Each attribute allows the researcher to answer specific questions about the nature of the sample. Researches may link specific debitage attributes to distinct technologies, knapping practices, industries, or reduction stages. They are able to accomplish this because flake attributes are found to co-vary with behavioral parameters (Odell 2003: 125). For example, striking platform morphology has frequently been used to determine what kind of hammer (hard or soft) was employed for lithic reduction at a site (Andrefsky 2001; Schindler and Koch 2012; Whittaker 1994).

Flake attribute analysis is a valuable way to make inferences about lithic production and activities within an assemblage as a whole. Unfortunately, this form of analysis is not without criticism. There are two chief complaints against flake attribute analysis: (1) analyzing each individual artifact and recording multiple attributes on each artifact can be very time consuming, especially with larger population sizes and, more importantly, (2) analysis may be hard to replicate depending on both the attributes selected and the methods employed for assessing the attributes (Ahler 1989; Fish 1978; Odell 2003; Shott 1994; Sullivan and Rozen 1985). Studies have found discrepancies in the data
recorded for a specimen between different individuals as well as in data recorded by one individual at different times (Fish 1978: 86). Discrepancies in attribute analysis can stem from instrument variation, imprecise measuring techniques, personal biases, and poor definition or poor application of the definition of an attribute (Fish 1978: 87). In order to minimalize variation, researchers must clearly define the attributes measured and explain precisely how they assessed them including what instruments and techniques they used. Discrepancies can be minimized when replicability problems are addressed.

Flake attribute analysis can then be an excellent tool for recognizing population trends and for making inferences about an assemblage. Using this form of analysis, in combination with the use of statistics, allows researchers to draw conclusions about trends and variations in prehistoric peoples’ behaviors and cultures. Researchers may discover what manufacturing techniques were employed at a site, what lithic technologies were present, and what artifacts were favored and used at a site among other things.

Typological Approaches:

Typological methods examine debitage attributes on individual specimens, unlike flake attribute analysis, which examines the distribution of select attributes over an entire assemblage (Andrefsky 2001:9). In typological analysis, individual specimens are classified into types based on characteristics that are thought to have technological or functional meaning (Andrefsky 2001; Odell 2003). For example, technological flake types may include hard hammer flakes, noted for
their large platforms, large bulbs of percussion and no lipping or *soft hammer flakes*, distinguished by their small platforms, lipping on the interior side of the platform, and a flat or diffuse bulb of percussion. The main advantage to this form of analysis is that a researcher can make behavioral inferences from a single specimen, thereby addressing some research questions in a time efficient manner. Naturally, an argument for the presence of a specific technology or behavior inferred from a flake type is made stronger with more evidence or a greater frequency of that type.

Andrefsky (2005) discusses four widely used typologies: (1) the *triple cortex typology*; (2) the *application load typology*; (3) the *technological typology*; and (4) the *free-standing typology*. The *triple cortex typology* classifies debitage as primary, secondary, or tertiary (PST) depending on the percentage of cortex present on the dorsal surface (Andrefsky 2005; Bradbury and Carr 1995). This classification allows the researcher to infer the reduction stage or stages present within the given sample. The *application load typology* examines what technology was used to detach a flake, typically hard-hammer percussion, soft-hammer percussion or pressure flaking. Hard and soft hammer characteristics have been described above. Pressure flakes, flakes detached by applying pressure to the stone using a flexible and durable tool like an antler, are often identified as small, thin flakes weighing less than flakes detached using percussion (Ahler 1989; Andrefsky 2005). *Technological typologies* divide debitage into types based on the reduction technology used to detach the specimen. Andrefsky (2005) offers the following popular types: bifacial thinning flakes, bipolar flakes, striking
platform and preparation flakes, and notching flakes. Andrefsky’s fourth most prevalent typological approach is the *free-standing approach*. Free-standing approaches strive to use replicable and unbiased criteria to classify debitage, and are not typically tied to the technology or function of the tools produced (Andrefsky 2001; Andrefsky 2005). Once the debitage typology is created, the types are then used as independent observations to make inferences about technology and function (Sullivan and Rozen 1985). One frequently cited example of a free-standing typology is the Sullivan and Rozen Technique (SRT), which simplifies lithic debris categories based on the artifact’s degree of breakage as opposed to its inherent diagnostic qualities (Sullivan and Rozen 1985).

Typological approaches to lithic debitage analysis as a whole are beneficial to a researcher because they can be less subjective and more time efficient than attribute analysis, in some cases offering immediate behavioral inferences from a single specimen (Andrefsky 2005), but they are not without problems. Triple cortex typologies have been criticized for being hard to replicate and for using unstandardized criteria and terminology for determining the presence, absence, or degree of cortex on a specimen (Sullivan and Rozen 1985:756). Application load typologies have also been criticized for poor or a complete lack of definitions, especially with regard to pressure flaking (Andrefsky 2005:118). Another problem application load typologies face is that investigators have found that hard and soft percussion can both produce the traits used to infer a specific percussion type (Bradley 1978; Schindler and Koch 2012;
Whittaker 1994). However, Schindler and Koch (2012) demonstrated that platform attributes are largely linked to specific percussion types. Sullivan and Rozen (1985:757-758) critiqued technological typologies for inconsistent definitions and applications of terminology and for the use of different debitage features for the identification of types by various researchers. Andrefsky (2005:123) notes that it can be confusing if researchers use the same terminology differently, but this in and of itself is not inherently wrong or even problematic, as long as the terms are explicitly defined. Although Free-standing typologies strive to use objective replicable criteria, the criteria they use are not always tied to prehistoric behavior, making it very problematic to use them as the basis for inferring the behavior of prehistoric people (Amick and Mauldin 1989; Kuijt et al. 1995; Andrefsky 2001:5).

The common problems researchers find with typological approaches include: difficulty with replication, inconsistent use of terminology and application of terms, and linking debitage types to a functional or technological interpretation without a clear explanation or evidence of how that link was made (Andrefsky 2001:9). In order for typological approaches to be effective, researchers must clearly define terms, record attributes in a manner that can be consistently replicated, and offer evidence for their interpretations.

*Aggregate Analysis:*

Unlike individual flake analysis (IFA), aggregate analysis shifts the focus from the single specimen to the whole population. Aggregate analysis uses a
constant standard to stratify the debitage assemblage, such as size or weight, and then compares the frequencies of debitage in each stratum (Ahler 1989; Andrefsky 2005; Shott 1994). This stratification highlights the differences and similarities in the lithic population and is then used to make interpretations. Almost all aggregate methods use size variation as a key to analysis (Ahler 1989; Andrefsky 2005; Shott 1994; Stahle and Dunn 1982). This is primarily due to the fact that flintknapping is a reductive process and the size of debitage is related to the size of the objective piece, with both decreasing as knapping continues. In fact, size can be diagnostic of different stages of reduction as well as different reduction techniques (Andrefsky 2005; Ahler 1989).

Shott (1994) and Ahler (1989) highlight the benefits of aggregate analysis. Unlike individual flake analysis, aggregate analysis can be applied efficiently to large assemblages, and if used correctly, it offers a highly reliable, consistent and replicable analytic technique that diminishes bias by treating all debitage equally and not selectively removing incomplete or ambiguous pieces. Furthermore, aggregate analysis offers investigators assemblage-level summary statistics and facilitates comparisons between assemblages (Shott 1994:87).

One of the more popular forms of aggregate analysis is known as mass analysis. Mass analysis (MA), developed by Ahler (1989), compares the number and weight of different size groups of debitage to infer the kinds of lithic reduction or tool production activities that are present at a site (Andrefsky 2005: 257). MA often uses nested screens or a similar means to quickly and efficiently sort debitage by size (Ahler 1989; Bertran et al 2012; Stahle and Dunn 1982). Sorting
debitage using screens is appropriate because archaeological data is often recovered in the field using ⅛ or ¼ inch mesh screens (Ahler 1989). Individual flake attributes, such as raw material type, may also be added as a filter to further explore assemblage variation.

Once lithics are stratified based on their size grades, their aggregate weights and counts are studied. Then this archaeological data is compared to a large experimental database which serves as comparative baseline for interpreting the archaeological sample. Discriminant function statistics is then applied to the assemblages to aid in interpretations.

Unfortunately, there are several problems with MA. One drawback is that MA requires a large experimental database, so that the researcher can use this as a baseline for comparison, without which there is no way to ensure correct interpretation (Ahler 1989; Andrefsky 2007; and Odell 2003). In fact, this experimental database can be quite time-consuming to construct in and of itself. Odell (2003: 131-132) notes that Ahler’s own experiments took several years to complete. Creating an experimental database is a big undertaking, for it involves knapping a sample in a controlled setting that matches the archaeological sample under study. For example, the same raw material found in the archaeological sample should be used for the experimental database, the material should be knapped in distinct episodes using one distinct technique per episode, and each episode should be sifted and weighed separately in order to create a baseline comparison for the different techniques. Experimental databases needed for baseline comparisons to real assemblages must match the
tools or technologies present in the archaeological assemblage. This results in a circular problem, for if the researcher needs to replicate a specific tool or technology to compare to the assemblage, he or she must know the kinds of tools and technologies needed for replication. If the investigator does know, what is the point of MA?—If the researcher does not know—how can he or she make a reliable database for comparison?

In addition to these problems surrounding the use of an experimental database, Andrefsky (2007) highlights other potential problems with MA:

1.) Individual knapping styles influence variation in debitage size grades, which may be erroneously interpreted as tool type variation when MA is applied.

2.) Variation in raw material size, shape, and composition also produce different debitage sizes that are not necessarily taken into account during MA.

3.) MA cannot distinguish between two reduction technologies (debitage mixing).

4.) Not all technologies leave a diagnostic signature that MA is able to interpret, for some debitage assemblages, when making size grade comparisons, are very similar even when different kinds of tools were produced. For example, Andrefsky demonstrates that four different production technologies, bifacial, Clovis point, blade, and bipolar production all have almost identical signatures, and that MA of size grades
was unable to distinguish them (see Figure 4.1 where four technologies plot similarly when using MA).

5.) Reduction stage analysis is only valid if the debitage assemblage is from a single reduction technology or a single technology. Not all lithic technologies result in gradually smaller detached pieces. For example, blades produced from blade cores are relatively regular in size even as the core is reduced, for blade core reduction is strategically used to obtain uniform detached pieces (Andrefsky 2007: 398).

Figure 4.1 Histogram Portraying Percentages of Size Grades by Weight for Various Reduction Technologies: Bifacial Reduction (BIFACE), Clovis Point Production (CLOVIS), Blade Reduction (BLADE), and Bipolar Reduction (BIPOLAR) (taken from Andrefsky 2007: Figure 7).
Andrefsky (2007) and Ahler (1989) both note the potential benefits to MA, but caution that it must be applied carefully, or interpretations gathered may be inaccurate.

4.2 ANALYZING THE BIRIMI ASSEMBLAGE

The Birimi site is located on a terrace, above a seasonal stream, south of the Gambaga Escarpment and 3.5 km northwest of the village of Nalerigu in the Northern region of Ghana (Casey 1993:113,116). The MSA artifacts of Birimi were found in several different locations at the site. The majority were found through surface collections on the flat terrace of the site, several pieces were found in situ approximately a meter below the surface, some were found in mixed contexts, recycled or redeposited within Kintampo deposits, and still others were found redeposited at the bottom of gullies, either washed off the top of the embankment or eroded out of the gully walls (Hawkins et al 2001:280).

In order to analyze the Birimi MSA assemblage, I first must determine what will be included in the analytical sample. Naturally, I am only able to include artifacts that have been recovered from the Birimi site, so the assemblage will have a recovery bias. Birimi is an active environment subject to heavy rainstorms, and the sample is biased toward larger pieces. Small flakes, are less likely to be seen and collected, are more likely to be sifted through mesh screens for in situ recovery, and are more likely to have been winnowed out by surface run-off during storms. I will also purposely exclude any specimens that do not have contextual integrity intact. This exclusion applies to any MSA artifacts
recovered from gullies, for they may have washed down embanks naturally, rather than being left there by knappers. It will also exclude specimens that were picked up by visitors to Birimi in an attempt to help with the recovery or simply out of curiosity. The assemblage analyzed in this thesis will include any MSA mudstone lithics that have contextual integrity. This includes 1,775 specimens, most of which are surface finds. Surface artifacts are not the most ideal finds contextually, but their location may still offer a rough idea of the spatial layout of the activity areas at the Birimi site.

I determined that a macroscopic IFA approach, specifically attribute analysis for the flake debitage coupled with a typological approach for tool analysis, will provide the most accurate results and offer the most information for the Birimi MSA assemblage. Andrefsky (2005:142) has found that the most convincing interpretations of debitage analysis come from IFA. Although a time consuming process, IFA will allow me to analyze each flake’s morphology and technology, revealing any individual nuances. Considering specimens individually rather than en masse is particularly relevant for the Birimi assemblage because I am specifically looking for evidence of core preparation techniques. IFA will allow me to provide a clear description of the assemblage and deliver an analysis that lends itself to comparison, a priority for this understudied region.

MA approach was considered, but was ultimately found to be an unviable choice. Although at first glance the Birimi assemblage may seem like a good candidate for MA because only one raw material type is being examined, the Birimi assemblage is not because it is biased toward larger specimens, is likely
technologically mixed, and certainly contains more than one reduction episode. An experimental database needed for MA interpretations is also lacking for an assemblage resembling Birimi’s.

The specific attributes used in this thesis and the particular methodology employed will be discussed and defined in the following section.

4.3 METHODOLOGY FOR ANALYZING LITHICS

The MSA assemblage was separated from other artifacts in the lab and then subjected to IFA. IFA analysis requires the sorting of the artifacts into types followed by attribute analysis. The Birimi assemblage was first divided into two groups: debitage and nondebitage. The debitage category was formed using Sullivan and Rozen’s (1985) attribute key (Figure 4.2), and includes complete flakes, broken flakes, flake fragments and debris (this includes chunks or blocky fragments). The nondebitage category is comprised of cores and tools. Next, attributes including general morphological characteristics (maximum length, width, height, weight, color, etc.), and technological characteristics (platform preparation by grinding or flaking, direction of dorsal scars, use wear, etc.) were measured, coded, and recorded. Figure 4.3 offers examples of common flake attributes. All linear measurements in this study were taken using a 6” digital slide caliper by Cent-Tech with precision to the hundredth millimeter. All weight measurements were taken to the nearest tenth of a gram for every artifact using a Sartorius PT 1200 portable electronic scale. All data was entered directly into an Excel spreadsheet. A minimum set of attributes is modeled on part by Shott.
(1994), who suggested including weight, dorsal or platform cortex, dorsal flake scar count, platform condition, platform angle, flake condition (either broken or complete), and raw material type as recorded attributes. I omitted the platform angle attribute from my analysis based on its poor replicability and on the unreliable nature of taking accurate angle measurements (as suggested by Andrefsky 2001:10). The majority of my analytical techniques are based on Andrefsky (2005). Debitage was analyzed separately from nondebitage (cores and tools). Tools were subjected to a typological analysis. The typology used for the Birimi tools is adapted from François Bordes’ (1961) typology (see discussion of tools below). The attributes studied for each of these categories are discussed and defined below.

Figure 4.2 Technological Attribute Key Used in the Sullivan-Rozen Technique and Adopted for the Birimi Assemblage for Defining Four Debitage Categories: Complete Flakes, Broken Flakes, Flake Fragments, and Debris (taken from Sullivan and Rozen 1985: Fig. 2).
Debitage Attributes and Definitions:

Debitage

Debitage is essentially “…flaked stone materials [that are] not recognized as cores or retouched tools” (Fish 1981: 374). The debitage category is based on Sullivan and Rozen’s (1985) attribute key (Fig. 4.2), and includes complete flakes, broken flakes, flake fragments and debris.

Raw Material

Raw material refers to the type of stone the artifact was made on. The distinct raw material that the MSA artifacts of Birimi were knapped on is siliceous mudstone. MSA materials are yellowish brown in color with some variation
Instrumental Neutron Activation Analysis of the raw material indicates that all colors of siliceous mudstone at the site came from the same geological beds, most likely from a source about 25 kilometers from the Birimi site (Hawkins et al 2001: 284).

**Complete Flake**

A complete flake is simply one that is whole. It must have a discernable dorsal and ventral surface, a recognizable point of applied force or striking platform, and intact margins, though there may be small nicks or damage along the edge as long as it does not impede the taking of measurements (Debénath and Dibble 1994:11).

**Broken Flake**

A broken flake is a flake that has one or more broken margins. Like a complete flake, it has a discernable dorsal and ventral surface, a recognizable point of applied force or striking platform (essentially an intact proximal end), however the distal end or a lateral edge is incomplete.

** Flake Fragment**

A flake fragment is a flake that is recognized to have a dorsal and ventral surface, but no proximal end. It is determined to be a distal flake fragment if the termination is present or a medial flake fragment if no termination is readable (Figure 4.4).
Figure 4.4 Flake Fragments Shown from the Ventral Side: (a) Proximal End Intact, an Example of a Broken Flake; (b) No Discernable Termination or Proximal End, an Example of a Medial Flake Fragment; (c) Distal End Intact with Feather Termination, No Proximal End, an Example of a Distal Flake Fragment; (a-c) If All Three Pieces Are Intact Together, Intact Proximal End, Margins, and Termination, Offer an Example of a Complete Flake (taken from Andrefsky 2005: 88 Figure 5.2).

Debris

Debris is a piece that does not exhibit flake, tool, or core characteristics and the original form cannot be determined (Figure 4.5). Rosen (1997:24) notes that this category can be problematic and is typically the result of uncontrolled
flintknapping. He says, “[d]ebris is amorphous, that is, without standardized features. The class consists of chunks and chips. Chips are less than 2 cm in maximal dimension, chunks greater” (Rosen 1997:30). Chunks and chips are sometimes referred to as angular shatter.

Figure 4.5 Examples of Debris/Angular Shatter Debitage (taken from Andrefsky 2005 Figure 4.11).

**Condition**

Condition refers to the physical state of the surface of the rock (patinated or unpatinated). In the case of the Birimi MSA assemblage, the lithics almost all have some form of patina present on the exposed outerlayer. Patination is a
discoloration in the thin outerlayer on the surface of the rock due to local aging conditions that may include chemicals in the soil and atmosphere or weathering (Hranicky 2013:377).

Cortex
Cortex is the chemical or mechanical weathering of the stone surface that can result in a color or texture change on the rock (Andrefsky 2005: 103). Dorsal cortex can be a good indicator of reduction stage (Andrefsky 2005; Magne and Pokotylo 1981). The amount of cortex present on the dorsal surface of the flake debitage was recorded following a modification of Andrefsky's ordinal scale (2005:105-106). A rank value of “3” is given if the cortex present on the dorsal surface is equal to or greater than 50%; this type is a primary flake. A value of “2” is coded if the specimen has cortex present, but it falls below the 50% margin; it is called a secondary flake. A value of “1” is coded if the specimen has no cortex present; this is considered a tertiary flake.

Color
The Birimi assemblage will be coded using six different color types (Fig. 4.6). The colors were categorized using a Munsell Color Chart to offer standardized and identifiable colors. Lithics were matched with the closest corresponding color type. Type 1: 5GY 7/1 Light Olive Gray; Type 2: A mix between color Type 1 and 10YR 5/6 Yellowish-Brown; Type 3: 2.5YR 3/6 Dark Reddish Brown; Type 4:
5YR 7/1 Light Brownish-Gray; Type 5: 10YR 5/8 Yellowish-Brown; and Type 6: 2.5Y 8/2 Light Gray.

**Figure 4.6 Birimi Color Typology**

**Weight**

Artifacts are weighed on a digital scale with precision to at least one-tenth of a gram (0.0 g). Weight is easily, accurately, and quickly measured and digital scales have made this attribute’s data easy to replicate. Shott (1994) includes it on his list of minimum attributes to record and analyze. As previously mentioned, weight can be used to interpret the stage or degree of reduction and has been found to covary with other linear dimensions (Magne and Pokotylo 1981; Odell 2003; Shott 1994). “Weight is perhaps the most important single variable by which to infer reduction stages…” (Magne and Pokotylo 1981:40).
Length
Length is the maximum flake length measured in a straight line from the proximal to the most remote distal end, starting at the center of the striking platform and measuring along the direction of striking. If an artifact’s whole Length is absent then this measure is left blank.

Width
Width is the longest straight line distance measured perpendicular to Length, irrespective of where it occurs on the artifact. If an artifact’s whole width is absent then this measure is left blank.

Thickness
Thickness is the maximum measure from the dorsal side to the ventral side of the flake, perpendicular to the flake length measurement.

Striking Platform Type
“Striking platforms are surfaces that are usually impacted by a percussor to detach a flake” (Andrefsky 2005:94). They have been used to determine technological organization, stage of tool production, and the type of percussor used. The Birimi assemblage striking platforms are categorized into six types, three of which were adapted from Andrefsky’s striking platform typology (see Andrefsky 2005: 94-98).
Type 1) Cortex- a cortical striking platform is wholly or partially covered in cortex;
Type 2) Simple or Flat- are smooth striking platforms that have no cortex or facets;
Type 3) Dihedral- are striking platforms that have two facets;
Type 4) Complex- are striking platforms that have three or more facets;
Type 5) Crushed- are striking platforms that were heavily damaged during impact;
Type 6) Indeterminate- these are platform types that are unknown or are too small to determine.

Platform Width
Platform width is the longest measure on the striking platform from lateral margin to lateral margin. It is measured in the same direction as width.

Platform Thickness
Platform Thickness is the greatest distance on the striking platform from the dorsal to the ventral surface, perpendicular to the platform width. It is measure in the same direction as thickness.

Platform Lipping
Platform Lipping is recorded as a present/absent attribute. Lipping is determined by running a finger across the ventral edge of the platform. If it catches, then the platform is identified as lipped. If it is smooth and no catching occurs, then lipping is absent on the platform. The presence or absence of lipping, in addition to the
characteristics of the bulb of percussion, often correlate with the hammer type used.

**Bulb of Percussion**

The bulb of percussion “…is formed as a result of the Hertzian cone turning toward the outside of the objective piece” (Andrefsky 2005:252). If present, the bulb of percussion is found on the ventral surface of a flake near the proximal end. The presence or absence of the bulb of percussion in addition to its characteristics (salient or diffuse) has been found to correlate with hammer type used, especially when studied in relationship to platform attributes (Andrefsky 2005; Odell 2003; Schindler and Koch 2012). In this study the bulb of percussion is recorded as being either diffuse (relatively flat) or salient (rather prominent). In the case of a bulb appearing moderately sized, it is marked as prominent.

**Termination**

This attribute records the condition of the edge present at the distal end of the flake. Andrefsky (2005:87) explains the four types of flake termination, which were recorded as feathered, hinged, snapped/stepped, or outré passé for the Birimi assemblage. Feather terminations are smooth terminations that shear from the objective piece. Hinged terminations are when the force turns and rolls away from the objective piece. Step termination is when the flake snaps during removal from the objective piece at almost a 90° angle. Outré passé terminations, also called overshot terminations, are when the force rolls towards the objective
piece, often removing a portion of it that remains attached to the flake at the distal end (Figure 4.7).

Figure 4.7 Examples of Flake Termination: (a) Feather Termination; (b) Stepped Termination; (c) Hinged Termination; (d) Outré Passé or Overshot Termination (taken from Andrefsky 2005: Figure 5.1).

Dorsal Flake Scars
Dorsal flake scars “…are the impressions found on the dorsal surface of a flake debitage specimen caused by the removal of previous flakes from the objective piece” (Andrefsky 2005: 106). Counting dorsal flake scars can reveal the stage of reduction present on the specimen, with a few large flake scars indicating the earliest stages and numerous small scars representing late stages. Andrefsky’s four-value ordinal scale (see Figure 4.8 below) was used to measure the number
of flake removals (Andrefsky 2005:108-109). Using this scale a “0” is given to flakes that have a cortical dorsal surface and no dorsal flake scars. A “1” is assigned to flakes with a single dorsal flake scar removed. A value of “2” is given to flakes with two dorsal flake scars removed. And all flakes that have more than two dorsal scar remnants are given a value of “3”. In this ordinal system, all small flake removals that are the result of striking platform preparation, damage breaks, or modification are not included in the count.

Figure 4.8 Examples of Dorsal Flake Scar Scale: (a) 3; (b) 2; (c) 1; (d) 0 (taken from Andrefsky 2005: Figure 5.13).
**Dorsal Flake Scar Direction**

Dorsal flake scar direction refers to whether dorsal flake scars were removed from one direction or more than one direction. This was recorded as “Uni” for one direction and “Multi” for more than one. If no flake scars were removed on the dorsal side of the specimen “Not Applicable” was recorded. The dorsal flake scar direction can help determine if a specimen has linear or centripetal Levallois characteristics.

**Modification**

Modification is a present, absent, or undetermined category that refers to whether or not the specimen was altered after it was detached from the objective piece. The following types of modification are examined and recorded in this study: usewear, retouch, grinding, and polishing.

**Usewear**

Usewear is modification present on the specimen resulting from use as a tool (Andrefsky 2005:262). Usewear is typically found on the working surfaces or edges of the lithic artifact and will vary depending on what the artifact was used for (grinding, sawing, cutting, or piercing). Types of usewear damage include step fractures, micro-flake scars, surface polish and striation, and edge rounding (Odell 2003). Material residue may also be found on the artifact after use, but it is unlikely that residue will be recognized on the Birimi MSA assemblage due to the fact that Birimi is an open-air site. Usewear, however, can be hard to distinguish
from damage caused by post-depositional factors including prehistoric occupants, natural forces, archaeological recovery, and storage techniques (Odell 1980: 96). In this study, usewear is recorded as a present/absent trait.

**Retouch**

Retouch is the “[i]ntentional modification of a stone tool edge by either pressure or percussion flaking technique” (Andrefsky 2005:260). Retouch flake scars tend to be larger, more invasive, and more regularly placed than usewear damage (Odell 1980:96). In this study, retouch is recorded as a present/absent trait for the removal of flakes from the artifact after it has been struck from the core. To distinguish intentional retouch from usewear or depositional damage it was determined at least three continuous flake scar removals needed to be present.

**Grinding**

Grinding is “the removal of small amounts of material from an objective piece by rubbing or abrading with a coarse stone or with an abrasive material such as sand” (Andrefsky 2005:256). Intentional grinding can be determined by feeling for differences in surface texture and sharpness of exposed edges, examining with magnifying glass for striations (low power 10X magnification is used in this study), and by observing contours—looking for flat or slightly convex or concave arcs (not an undulating surface) (Kowta 1980: 18). This is recorded as a present, absent, or undetermined attribute.
Polishing

Polishing can be determined by holding the specimen to a strong light and examining it from different angles to see if there is a difference in reflectance. Polishing is also often associated with striations perpendicular to the edge (Odell 2003:146). This is recorded as a present/absent attribute.

Comments

This section is for any observations that may be relevant that were not entered into the database as a recorded attribute. This includes comments like “Chunk” which refers to blocky or angular pieces that do appear to be cores; “Double Impact” which refers to a flake with two points of impact on the proximal end; “Rock” which refers to a piece collected and tagged, but with no observable artifact attributes; and “Levallois-like” which represents artifacts that appear to be Levallois in nature, but do not meet all the criteria needed to be classified as classically Levallois.

Core Attributes and Definitions:

Cores

Cores are “objective pieces which are primarily used as sources of raw material” (Andrefsky 2005:144). They can come in various sizes and shapes and may be formal or informal. Cores are also often characterized as being unidirectional, with detached pieces being removed in one direction away from a striking platform, or multidirectional, where removals are taken from more than one
striking platform and direction. Formalized core technologies often produce uniform detached pieces that are predictable in size and shape (for example blade core technologies). Formal core technologies use systematic patterns to obtain the most removals per mass of core as possible, whereas informal core technologies use a swift, more opportunistic approach (Andrefsky 2005). Levallois cores are an example of a planned, formal core technology.

**Maximum Linear Dimension (MLD)**

MLD is the greatest linear dimension available on the specimen. Since cores can be amorphous in shape, it is hard to determine which side is representative of length, width, or thickness, especially on multidirectional cores. For these reasons, Andrefsky’s (2005) suggestion of characterizing core size by weight and by maximum linear dimension will be adhered to in this study.

**Weight**

Cores, like other specimens, are weighed on a digital scale with precision to at least one-tenth of a gram (0.0 g).

**Cores Reduction Strategy**

The core reduction strategy notes whether the core specimen was reduced using a formal, informal, or an undermined method. If discernable, the type of strategy employed is named (centripetal core, blade core, etc.)
**Tool Typology and Definitions:**

The tools of Birimi will be examined and analyzed individually and then classified into a descriptive typology. Since the tools were made on flakes, the flake attributes recorded for debitage will also be recorded for flake tools. The typology serves two purposes: (1) artifact variability is ordered and described, which facilitates easy comparison to other sites or research, and (2) the tool types can be analyzed as a unit against other variables, such as temporal periods, geographic regions, or activity areas in order to determine if there is an association or behavioral patterns.

The typology I adapted for the Birimi MSA tools comes from François Bordes’ (1961) typology. Although there may be several drawbacks to adapting Bordes’ typology for the Birimi tools including that it is a Lower or Middle Paleolithic European lithic typology or that it has been criticized as being inconsistent or subjective in some instances, I have chosen to proceed with its use for two very specific reasons: (1) it is one of the most widely used typologies in the Old World, and (2) as a widely used, studied, and known typology it will lend itself quite easily to intersite comparisons and a greater archaeological dialog (Debénath and Dibble 1994:5). These are the desired goals for any typology, but they are especially important to address for the understudied MSA of West Africa.

In seeking a way to adapt Bordes’ typology for the Birimi tools, I found Debénath and Dibble’s (1994) *Handbook of Paleolithic Typology* indispensible. The authors described, defined, and provided examples of Bordes’ typology that I
relied heavily on for my creation of the Birimi tool typology. I note any divergence in my own typology for replicability.

The Birimi tool typology includes the following 19 types:

_Birimi Tool Typology:_

**Levallois Points**

Following Bodes (1953) and Tixier (1960), a Levallois point in this typology is a triangular shaped flake with a central ridge, occasionally with a triangle flake scar at the base due to a prior removal. The central or medial ridge guides the removal and predetermines the triangular form. I made no distinction between Levallois points that exhibit the triangular negative near the base and those that only exhibited the central ridge.

**Retouched Levallois Points**

Retouched Levallois points are Levallois point blanks that contain light retouch. If the point was made into another type of tool (for example, a notch or a denticulate), than the piece was classified according to the type of retouch. It is not commonly thought that Levallois points or retouched Levallois points represent real projectile points based on usewear analyses (Debénath and Dibble 1994:51).

**Pseudo-Levallois Points**

Pseudo-Levallois points are not the product of Levallois technology, but of disc-core technology. They mimic Levallois points in that they have a triangular shape
and can even exhibit a similar scar morphology. However, they are recognizable by the fact that their long axes (the axis from the distal most point) is oblique relative to their axes of flaking (defined as the axis that originates at the point of percussion and proceeds distally, perpendicular to the platform).

Naturally Backed Knives

Following Bordes (1961), a naturally backed knife in this typology is an unretouched flake or blade that has a sharp cutting edge on one lateral edge and a natural cortical or dull flat surface on the opposing edge. This backed edge should be perpendicular or nearly perpendicular to the interior surface. For Bordes (1961), naturally backed knives with a cortical back did not have to exhibit utilization, but naturally backed knives without cortex had to demonstrate evidence of utilization. Unlike Bordes, I did not require evidence of utilization on naturally backed knives with or without cortex to define this type. The reasons I differed is three fold: (1) Consistent and unambiguous definition of type was sought; (2) the condition of the Birimi mudstone artifacts made utilization and cortex hard to detect; (3) recognition of utilization is often subjective, for what may appear to be usewear may in fact be edge damage, and a piece may in fact be used, but may not leave recognizable traces.

Scrapers

Bordes’ (1961) general definition of a scraper, as translated by Debénath and Dibble (1994: 70), is: “an object made on a flake or a blade, Levallois or not, with
continuous retouch that is flat or abrupt, scaled or not, on one or more margins, in order to produce a more or less cutting edge which is straight, convex, or concave, with no deliberate notching or denticulation.” From this broad definition, scrapers can be subdivided into various types. Bordes primarily defined types of scrapers based on the retouch present and its location on the tool. In this typology, I do the same, though the Birimi MSA assemblage does not contain nearly as many scraper types as Bordes defined. The following seven types are those present within the Birimi assemblage.

**Single Sidescrapers**

A single side scrapper has one retouched lateral edge on the exterior. The retouched edge is distinguished by shape and may be straight, convex, or concave.

**Endscrapers**

An endscraper is a flake or blade that exhibits retouch on one of its ends (distal or proximal) resulting in an edge that is usually rounded or convex and rarely straight.

**Double Scrapers**

Double scrapers are scrapers that have two non-adjacent retouched edges. The retouched edges are distinguished by shape and each edge may be one of the following shapes: straight, convex, or concave.
Convergent Scrapers

Convergent scrapers are double scrapers that have two retouched edges that eventually converge or meet at one end, typically the distal end. The retouched edges are distinguished by shape and each edge may be one of the following shapes: straight, convex, or concave.

Déjeté Scrapers

Déjeté scrapers are convergent scrapers that have two retouched edges that meet at an angle greater than 45 degrees relative to the axis of flaking (the axis that originates at the point of percussion and proceeds distally, perpendicular to the platform). Essentially déjeté scrapers are skewed convergent scrapers.

Scrapers on the Interior Surface

Scrapers on the interior surface are a form of scrapers that have retouch on the interior or ventral side of a scraper. No distinctions are made for edge shape.

Alternate Scrapers

Alternate scrapers are double scrapers that have opposite lateral edges and alternating surfaces retouched. For example one lateral edge may be retouched on the exterior margin and the opposite lateral edge would be retouched on the interior margin. This is different from alternating retouch, which is retouch that occurs on the same edge, but alternates between interior and exterior surfaces.
Notches

Notches are flakes that have a hollow concavity on an edge, usually made from a series of small contiguous removals. Notches can occur on either surface or any edge. More than one notch may also be present on the same tool as long as they are not adjacent, in which case the tool would be classified as a denticulate.

End-Notched Pieces

End-notched pieces are flakes or blades that have a notch located on the distal end of the piece.

Denticulates

Denticulates are flakes or blades that have two or more contiguous notches present sometimes creating a saw-like or serrated edge.

Racloirs-Denticulés

Racloirs-Denticulés are a grade between scrapers and denticulates. They have continuous retouch that suggests a scraper, but the retouch is irregular suggesting a denticulate.

Perçoirs

Perçoirs or “borers” are flakes or blades that have one or more small isolated pointed tip(s) (Debénath and Dibble 1994:99).
**Bifaces**

Bifaces are tools that have “two surfaces (faces) that meet to form a single edge that circumscribes the tool. Both faces usually contain flake scars that travel at least half-way across the face” (Andrefsky 2005:253).

**Blades**

Blades are “a type of detached piece with parallel or subparallel lateral margins” (Andrefsky 2005:253). They are typically at least twice as long as they are wide.

**Miscellaneous**

The Birimi assemblage has several pieces that were intentionally retouched, however, these specimens do not resemble known or comparable categories, either due to fragmentation or unique morphology. These were simply labeled miscellaneous.

Additional attributes will be recorded for bifaces in the hopes that intersite or regional point style comparisons may be made. Site comparisons are a goal of this thesis as is identifying modern behavioral traits. And, as discussed in Chapter 2, style, as an extension of symbolism, is a criterion for modern human behavior. Projectile points are thought to reveal stylistic information for two main reasons: (1) knappers are limited by raw material constraints and desired functional traits, so successful point designs tend to be replicated, and (2) points are often shared or exchanged and this in turn often imposes cultural constraints
to what is deemed an acceptable design (McBrearty and Brooks 2000:498). The attributes recorded for bifaces are:

**Biface Length**

Length is the maximum measurement taken from the tip to the base of complete or very nearly complete bifacial points.

**Biface Width**

Width is the maximum measurement measured from one lateral edge to the other, taken perpendicular to the maximum length measurement.

**Biface Thickness**

Thickness is the maximum measurement from one surface to the other, perpendicular to the biface length.

**Biface Weight**

Bifaces are weighed on a digital scale with precision to at least one-tenth of a gram (0.0 g).

**Base Shape**

The base shape is the overall shape of the distal or basal end of a biface (concave, convex, straight).
Blade Shape

The blade shape is the overall shape of the lateral edges of the biface (lanceolate, ovate, triangular, and constricted are some common blade shapes).

Flaking Pattern

The flake removal pattern present on the surfaces of the biface demonstrate how the flintkapper worked, examples include collateral, horizontal transverse, oblique transverse, and random patterns.

Comments

This section is for any observations that may be relevant that were not entered into the database as a recorded attribute. For bifacial tools this includes noting the presence and location of any apparent hafting, resharpening, impact fractures, the completeness of the artifact, and any identifiable usewear that may be present on the specimen, such as polishing or grinding.

4.4 SUMMARY

This chapter has discussed some of the common trends in macroscopic lithic debitage analysis. It has also identified the form of analysis that best suites the Birimi MSA assemblage, specifically IFA. I believe that this chosen methodology will reveal what lithic technologies the people of Birimi implemented. This, in turn, will allow for inferences to be made about behavior and cognition in the MSA. And lastly, this chapter provided clear definitions and
descriptions for terminology, attributes, and lithic categories used and subjected to analysis for this thesis. These descriptions can be used when conducting intersite comparisons or replicable analysis.
CHAPTER 5
ANALYSIS AND RESULTS

This chapter presents the results of my analysis and directly addresses the questions asked in Chapter 1: (1) What is the nature of the MSA assemblage of Birimi?; (2) Does this assemblage reveal modern human behavior, and if so, how?; and (3) How does the MSA of Birimi compare to the greater MSA of Africa and to the MSA of West Africa in particular? Answers to these questions are significant. They will offer an in-depth description of the Birimi MSA lithic assemblage that seeks to facilitate intersite comparisons, the people of Birimi’s technological complexity and preferences will be highlighted, and gaps in the MSA record of West Africa will be narrowed.

This Chapter is organized into five sections. First, the nature of the assemblage is discussed using the applied Individual Flake Analysis (IFA) approach. Second, the presence of behavioral modernity at Birimi is revealed through the presence of technological complexity and symbolism as it is related to regional point style. Third, a rough sketch of Birimi’s place in the West African MSA is drawn through broad intersite comparisons. Fourth, a review of the various and dynamic technologies, artifacts, and behaviors present in the general MSA is offered with a comparison to the Birimi site. And finally, a summary and a brief discussion of the results are presented.
5.1 PRESENTATION OF THE BIRIMI ASSEMBLAGE

*Individual Flake Analysis:*

In order to address the nature of the MSA at the Birimi site, the Birimi assemblage was subjected to IFA. A total of 1,775 siliceous mudstone specimens were examined using IFA. The attributes recorded for analysis were artifact type, color, weight, length, width, thickness, platform condition, platform width and thickness, termination, size of the bulb of percussion (if present), presence or absence of cortex, dorsal flake scar count and direction, and the presence or absence of modification, and if present, how it was modified (usewear, retouch, grinding, etc.).

A total of 1,143 flakes, 115 cores or core fragments, and 113 tools were examined (see Table 5.1 below). The remaining specimens were classified as debris or undetermined. Five artifacts deemed “undetermined” were not assigned a type, either because they were too weathered or too small to submit to adequate analysis.

**Table 5.1 Relative Counts of Artifact Types Present at Birimi**

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Flakes</td>
<td>305</td>
<td>17.18</td>
</tr>
<tr>
<td>Broken Flakes</td>
<td>420</td>
<td>23.66</td>
</tr>
<tr>
<td>Flake Fragments</td>
<td>418</td>
<td>23.55</td>
</tr>
<tr>
<td>Cores/Core Fragments</td>
<td>115</td>
<td>6.48</td>
</tr>
<tr>
<td>Tools</td>
<td>113</td>
<td>6.37</td>
</tr>
<tr>
<td>Debris</td>
<td>399</td>
<td>22.48</td>
</tr>
<tr>
<td>Undetermined</td>
<td>5</td>
<td>0.28</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1775</td>
<td>100.00</td>
</tr>
</tbody>
</table>
The siliceous mudstone recovered at Birimi varies in colors due to a patina present on the exposed outer layer of the rocks. Patination discoloration may differ for a variety of reasons including local chemicals in the soil and atmosphere or weathering, so it is unlikely that the people of Birimi were favoring certain colors of mudstone over others. Indeed Instrumental Neutron Activation Analysis of the raw material indicates that all colors of siliceous mudstone came from the same geological beds about 25 kilometers from the Birimi site (Hawkins et al 2001). Patinated MSA pieces that suffered recent breaks also presented with the unpatinated colors on the fresh break surface indicating that the unpatinated colors were the original colors selected by the knappers either intentionally or unintentionally.

A color typology for the mudstone present at Birimi was established and consisted of six main types (Figure 4.6). Only patinated mudstone artifacts that had a clear association with the MSA component of Birimi were included in this study. MSA surface lithics were separated from the LSA lithics by the criteria outlined in Chapter 2 (size, technology, and color of patination). Color Types 3, 4, 5, and 6 were determined to have a clear association with the MSA rather than the LSA. Artifacts with color Types 1 and 2 were thus excluded from this analysis. This exclusion was also applied to specimens that presented with a mix of MSA and LSA color types.

Lithics occasionally presented with multiple color types. In this scenario, the majority color type was documented. If more than one MSA color was equally represented on the specimen, then both color types were recorded for the
specimen, which subsequently led to a Mixed Color Type category being added to the color typology. This mixed category made up 9.3% of the entire assemblage.

The assemblage varied in color, but the majority of artifacts, 61.97%, presented with color Type 5, a yellowish-brown (Table 5.2 and Figure 5.1). The smallest color type, representing only 6.54% of the population, was Type 3, a dark reddish-brown. Types 4 and 6 were present in similar quantities with Type 4 making up 11.49% and Type 6 making up 10.70% of the whole population. Type 4 is light brownish gray in color and Type 6 is light gray.

Table 5.2 Color Type Distribution

<table>
<thead>
<tr>
<th>Color Type with Munsell Classification</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 3 (2.5YR 3/6 Dark Reddish Brown)</td>
<td>116</td>
<td>6.54</td>
</tr>
<tr>
<td>Type 4 (5YR 7/1 Light Brownish-Gray)</td>
<td>204</td>
<td>11.49</td>
</tr>
<tr>
<td>Type 5 (10YR 5/8 Yellowish-Brown)</td>
<td>1100</td>
<td>61.97</td>
</tr>
<tr>
<td>Type 6 (2.5Y 8/2 Light Gray)</td>
<td>190</td>
<td>10.70</td>
</tr>
<tr>
<td>Types 3 &amp; 4</td>
<td>5</td>
<td>0.28</td>
</tr>
<tr>
<td>Types 3 &amp; 5</td>
<td>30</td>
<td>1.69</td>
</tr>
<tr>
<td>Types 3 &amp; 6</td>
<td>12</td>
<td>0.68</td>
</tr>
<tr>
<td>Types 4 &amp; 5</td>
<td>22</td>
<td>1.24</td>
</tr>
<tr>
<td>Types 4 &amp; 6</td>
<td>4</td>
<td>0.23</td>
</tr>
<tr>
<td>Types 5 &amp; 6</td>
<td>92</td>
<td>5.18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1775</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Figure 5.1 Color Type Frequency for MSA Mudstone Artifacts of Birimi

Flake Size:

Flakes can vary widely in size and form, but factors influencing this variation are limited. Some factors that influence variation in flakes include the individual knapper’s style and tools, the raw material, error, and fracture mechanics. Patterned flake size has the potential to reveal what form of percussion the knapper utilized, what technology he or she was employing, or even the stage of reduction. The Levallois technique, a common MSA technique, often produces larger flake sizes. Complete flakes will naturally provide the most reliable data on flake size, for this category is the only intact flake category. Thus only the 305 complete flakes recovered from Birimi will be considered for this portion of the analysis, a relatively small number of complete flakes.
Table 5.3 Descriptive Statistics of Complete Flakes Sizes

<table>
<thead>
<tr>
<th></th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Thickness (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>34.73</td>
<td>31.66</td>
<td>9.67</td>
<td>11.26</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>13.57</td>
<td>11.82</td>
<td>4.30</td>
<td>11.78</td>
</tr>
<tr>
<td>Minimum</td>
<td>11.13</td>
<td>9.35</td>
<td>2.11</td>
<td>0.3</td>
</tr>
<tr>
<td>Maximum</td>
<td>103.22</td>
<td>72.38</td>
<td>27.27</td>
<td>97.8</td>
</tr>
<tr>
<td>Median</td>
<td>33.63</td>
<td>29.9</td>
<td>9.40</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Metric measurements of the Birimi complete flake assemblage are quite variable with large standard deviations (Table 5.3). The median length of the complete flakes is 33.63 mm, the median width is 29.9 mm, the median thickness is 9.4 mm, and the median weight is 7.7 g. This data indicates that flakes at Birimi were commonly, relatively large. Figures 5.2 and 5.3 offer box plots of the Birimi complete flake data, and are an easy way to express the typical flake size. These figures highlight the median length, width, thickness, and weight, which is useful since the median is less susceptible to outliers than a mean. The box plots use (+) to indicate which flake sizes are outliers or which fall outside the normal size range for Birimi. Although these outliers may not represent the typical flake size recovered at Birimi, it is important to note their presence, because they demonstrate that the stone workers of Birimi had the capacity to produce quite large flakes.
Figure 5.2 Box Plots Demonstrating Complete Flake Sizes at Birimi

Figure 5.3 Box Plot Demonstrating the Median Weight of Complete Flakes at Birimi
Striking Platforms:

This analysis will only incorporate the striking platform data present on complete and broken flakes (n=725 flakes), since flake fragments and debris categories do not offer intact platform specimens. Complete flakes are fully intact, whereas broken flakes have an intact platform, but lack intact margins. The average size of striking platforms in the Birimi assemblage is 17.63 mm wide by 6.73 mm thick, which is relatively large considering the average size of flakes at Birimi. Large platforms relative to flake size are an indicator of hard hammer percussion, for if the platforms were small they would collapse (Kooymann 2000:79).

The platforms of this assemblage have been categorized into six types: Cortex, Flat, Dihedral, Complex, Crushed, and Indeterminate (see Chapter 4). The majority of platforms were simple or flat (39.59%), followed closely by complex platforms (31.17%) (see Table 5.4 below). The indeterminate striking platforms are indecipherable due to weathering.

Table 5.4 Striking Platform Types for Complete and Broken Flakes

<table>
<thead>
<tr>
<th>Striking Platform Type</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortex</td>
<td>79</td>
<td>10.90</td>
</tr>
<tr>
<td>Flat</td>
<td>287</td>
<td>39.59</td>
</tr>
<tr>
<td>Dihedral</td>
<td>91</td>
<td>12.55</td>
</tr>
<tr>
<td>Complex</td>
<td>226</td>
<td>31.17</td>
</tr>
<tr>
<td>Crushed</td>
<td>36</td>
<td>4.97</td>
</tr>
<tr>
<td>Indeterminate</td>
<td>6</td>
<td>0.83</td>
</tr>
</tbody>
</table>
Flat and cortical platforms require little or no preparation. They are often indicators of early stage reduction or initial shaping, when careful platform preparation is not critical.

Complex platforms are significant because they are often indicative of core preparation (Andrefsky 2005). A platform that is properly prepared and strengthened will heighten the likelihood of proper flake initiation. In fact, Levallois products have been traditionally associated with complex platforms, though it has been determined that this is not a necessary criteria for Levallois flakes (Dibble and Bar-Yosef 1995:ix). Dihedral platforms are striking platforms that have two facets. They may suggest some platform preparation and can be taken conservatively as an indicator of core preparation.

Crushed platforms may be the result of hard hammer percussion. Hayden and Hutchings (1989) conducted a lithic experiment producing flakes using different methods of percussion, and they found that crushed striking platforms are often, though not always, the by-product of hard hammer percussion. In Haden and Hutchings (1989) experiments, 65% of the flakes that had crushed platforms were the result of hard hammer percussion, whereas only 11% of the crushed platforms were produced by soft hammer percussion (Hayden and Hutchings 1989).

Platform Lipping and Bulb of Percussion Analysis:

The application of hard hammer percussion often results in flakes that are distinguished by their large size, exhibit large platforms with no lip, and have
large or salient bulbs of percussion. This percussion technique is of particular interest for the Birimi assemblage because Levallois flakes are manufactured using hard hammer percussion. Many of the flakes at Birimi suggest that this technique was applied to detach flakes.

Both complete flakes and broken flakes were selected for this portion of analysis, since they both offer intact platforms. In this portion of the analysis platforms are considered for the presence or absence of lipping. Upon examining the complete and broken flake categories (n=725 flakes), it was determined that 85.66% presented without a platform lip and 66.9% contained salient bulbs of percussion. However, some flakes had mixed results, for example 8.83% presented with platform lipping, but had salient bulbs of percussion, and 27.31% had diffuse or flat bulbs of percussion, but no platform lip (see Table 5.5). It is evident that the trend at Birimi was to produce flakes with salient bulbs and no platform lipping, indicating that hard hammer percussion was the preferred method of flake detachment.

Table 5.5 Comparison of Platform Lipping and Bulb of Percussion Size for Complete and Broken Flakes

<table>
<thead>
<tr>
<th>Platform Lipping</th>
<th>Diffuse or Flat Bulb of Percussion</th>
<th>Salient Bulb of Percussion</th>
<th>Bulb of Percussion Removed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Lipping Present</td>
<td>39</td>
<td>5.38</td>
<td>64</td>
<td>8.83</td>
</tr>
<tr>
<td>Lipping Absent</td>
<td>198</td>
<td>27.31</td>
<td>421</td>
<td>58.07</td>
</tr>
<tr>
<td>Total</td>
<td>237</td>
<td>32.69</td>
<td>485</td>
<td>66.90</td>
</tr>
</tbody>
</table>
Reduction Stage:

One fundamental principle in lithic analysis is that stone working is a reductive process. And because the exterior weathered cortex of a stone must be removed in order to access the stronger, more predictable raw material beneath it, the initial flakes will contain remnants of this weathered rind on their dorsal surface. As the flaking process continues and the core is reduced, succeeding flakes will have less and less cortex, until eventually no cortex remains on the core or on the interior flakes. It can be inferred that the amount of cortex present on a flake is indicative of the reduction stage, with large amounts of cortex corresponding to early stages and little to no cortex corresponding to later stages (Andrefsky 2005). These inferences are often made for raw materials that occur as nodules rather than in geological beds. The siliceous mudstone from Birimi occurs in geological beds (Hawkins et al 2001).

In the course of analyzing the cortex surfaces of the lithics of Birimi, identification problems were encountered. The original surface cortex in many instances was difficult to identify because many of the examined flakes, tools, and cores were surface finds and were thus exposed to weathering elements after their initial reduction and use. Many of Birimi’s MSA artifacts exhibit heavily weathered or patinated outer surfaces that cannot be distinguished from the original cortex the MSA people of Birimi may have left on their artifacts. This inhibited an adequate identification of the presence or absence of cortex. Thus, given the identification problems, this form of analysis was abandoned.
An examination of dorsal scar counts for all complete flakes suggests a mix of reduction stages at Birimi. Only complete flakes were used for this portion of the analysis, since they were the only flake type that offered intact margins. As an objective piece is shaped or reduced, flake removals are increasingly recorded on the dorsal surface. Thus, flakes with few or no dorsal scar counts have not gone through extensive reduction and are representative of early reduction stages, whereas high dorsal scar counts are indicative of pieces that have been reduced more and correspond with late reduction stages (Andrefsky 2005: 106-107). Using a four value ordinal scale, taken from Andrefsky (2005), the dorsal flake scar removals were recorded for the MSA material from Birimi. Scar Removal 2, flakes that have evidence for at least two removals, and Scar Removal 3, flakes that show evidence for three or more previous flake removals, dominate the Birimi assemblage, however, Scar Removal 0, flakes with no scars, and Scar Removal 1, flakes with evidence for one previous flake removal, are also significantly present (see Table 5.6).

Table 5.6 Absolute and Relative Dorsal Flake Scar Removals for Complete Flakes

<table>
<thead>
<tr>
<th>Dorsal Flake Scars</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scar Removal 0</td>
<td>28</td>
<td>9.18</td>
</tr>
<tr>
<td>Scar Removal 1</td>
<td>72</td>
<td>23.61</td>
</tr>
<tr>
<td>Scar Removal 2</td>
<td>69</td>
<td>22.62</td>
</tr>
<tr>
<td>Scar Removal 3</td>
<td>136</td>
<td>44.59</td>
</tr>
<tr>
<td>Total</td>
<td>305</td>
<td>100.00</td>
</tr>
</tbody>
</table>
The dorsal flake scar counts at Birimi emphasize late stage reduction. In terms of relative frequency, 67.21% of the complete flakes have two or more removals, indicating later reduction stages, whereas only 32.79% of the complete flakes have one or no dorsal flake scar removals, pointing to earlier reduction stages (see Figure 5.4).

**Figure 5.4 Flake Scar Removal Counts by Reduction Stage for Complete Flakes**

*Modification:* Modification, or the altering of a flake after it was detached from the objective piece, was an observed attribute for the Birimi assemblage. The types of modification recorded for this population were usewear, retouch, and grinding. Initially, data was also going to be collected on the number of MSA artifacts with surface polish modification, but the long weathered and heavy patinated pieces
almost all exhibited a degree of surface shine or polish. Unfortunately, it was
difficult to determine whether this polish was intentional or a consequence of
exposure, thus this category of modification was excluded from further analysis.

Usewear, or modification present on an artifact resulting from its use as a
tool (Andrefsky 2005), was difficult to determine and distinguish from damage. In
fact, Odell (2003) notes that usewear is often a problematic attribute to record
because edge or artifact damage may be taken as evidence of usewear. Any
number of post-depositional factors such as the nature of the open-air site itself,
prehistoric occupants, animals, natural forces, archaeological recovery, and or
storage techniques may have altered the artifacts. Although these factors may
have had a role in any recorded modification, studying usewear and modification
on flakes and tools is an important way to determine variability in an assemblage,
artifact function, and activity use at a site.

The majority of artifacts, 83.04%, did not have confirmed usewear (see
Table 5.7). It is possible that the remaining 16.96% of artifacts do have usewear
present, but some artifacts were questionably or only lightly used. Only 7.89% of
the entire assemblage was positively identified as having usewear present. Of
the artifacts with usewear, 26.43% were formal shaped tools; the remaining
utilized pieces were simply informally used. This formal utilized tool category only
embodies 2.08% of the entire assemblage.

Related to usewear is retouch, which is the modification of the stone by
pressure or percussion flaking (Andrefsky 2005:260). Unlike usewear damage,
retouch tends to leave flake scars that are larger, more regular, and more
invasive, typically along the edge (Odell 1980:96). Only a small portion, 10.2%, of the Birimi assemblage was retouched. Of these retouched artifacts, 38.67% were formal shaped tools, which is equal to 3.94% of the entire assemblage.

Very few artifacts, 11 specimen representing 0.62% of the entire assemblage, were identified as being intentionally ground.

Table 5.7 Absolute and Relative Frequencies of Modification Categories for the Birimi Assemblage

<table>
<thead>
<tr>
<th>Modification</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undetermined</td>
<td>161</td>
<td>9.07</td>
<td>102</td>
<td>5.75</td>
<td>23</td>
<td>1.30</td>
</tr>
<tr>
<td>Present</td>
<td>140</td>
<td>7.89</td>
<td>181</td>
<td>10.20</td>
<td>11</td>
<td>0.62</td>
</tr>
<tr>
<td>Not Present</td>
<td>1474</td>
<td>83.04</td>
<td>1492</td>
<td>84.06</td>
<td>1741</td>
<td>98.08</td>
</tr>
</tbody>
</table>

Table 5.8 Modification Types Present Counting Each Specimen only Once

<table>
<thead>
<tr>
<th>Modification Present</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only Usewear</td>
<td>98</td>
<td>5.52</td>
</tr>
<tr>
<td>Only Retouch</td>
<td>140</td>
<td>7.89</td>
</tr>
<tr>
<td>Only Grinding</td>
<td>5</td>
<td>0.28</td>
</tr>
<tr>
<td>Usewear and Retouch</td>
<td>37</td>
<td>2.08</td>
</tr>
<tr>
<td>Usewear and Grinding</td>
<td>2</td>
<td>0.11</td>
</tr>
<tr>
<td>Retouch and Grinding</td>
<td>1</td>
<td>0.06</td>
</tr>
<tr>
<td>Usewear, Retouch, and Grinding</td>
<td>3</td>
<td>0.17</td>
</tr>
<tr>
<td>Total</td>
<td>286</td>
<td>16.11</td>
</tr>
</tbody>
</table>

Some of the artifacts have more than one modification type present on the same specimen. For example, 37 artifacts have both retouch and usewear
present, and 6 of the ground pieces have either retouch or usewear present or both (Table 5.8 above). Counting each modified specimen only once, this data suggests that 16.11% of the assemblage was selected for use or modification either as formal tools or informal, expedient pieces.

There are two other possible forms of modification that need attention. The first is that 23 artifacts presented with fire damage evident as deep surface cracking, vesiculation, discoloration, and potlids. Deal (2012) recognizes these features as belonging to fire treated or damaged rocks. The majority of these fire-damaged rocks were lithic debris (15 of the 23 specimens or 65%). Spatial correlation was tested for these 23 specimens in order to determine if they were recovered from similar locations. Only 3 separate groups of 2 artifacts were found together, the rest were isolated from each other. Since the majority of these specimens belong to the debris category and since the fired lithics only represent 1.3% of the Birimi assemblage, it seems likely that this damage was unintentional and not a result of the Birimi people fire-treating lithics for subsequent use.

The last form of modification that bears consideration is the removal of a flake’s bulb of percussion. This modification is accomplished by producing a flake with a pronounced bulb, and then by removing the bulb with a second flake. Three flakes were recovered from the Birimi assemblage with their bulbs removed. The intentionality or purpose behind these removals is unknown. However, a known method of producing flake blanks that uses this form of modification –striking a flake from a core and then using that initial flake as a
core by the subsequently removing the bulb of percussion—are part of a prepared-core technique called the Kombewa technique (Debénath and Dibble 1994: 29). The Kombewa technique is found all over the world, in Africa, Europe and Asia (Barham 2013: 158). These bulb removals present within the Birimi assemblage mirror this technique, however, the principle of equifinality may be at work, and the minuscule number of these flakes recovered strongly suggests that they were unintentional or at least rarely sought.

*Levallois Flakes:*

Levallois flakes are produced using a largely uniform process, the Levallois prepared core technique (see discussion in Chapter 3). This prepared core technology is seen as evidence for complex mental abilities and as a cognitive leap in human evolution. The carefully shaped core and the ensuing predetermined flakes are important characteristics that distinguish the Levallois technique from other flake blank technologies that typically harvest flakes from cores opportunistically without a predetermined mental map (Dibble and Bar-Yosef 1995: ix).

While the technique is uniform, there can be great variability in the shape of a Levallois flake. For, although one core will produce relatively similar Levallois flakes, the flakes from another core will vary in shape when compared to the flakes from the first core.

In the Birimi assemblage, multiple Levallois flakes and points were recorded. Although the Levallois points are technically triangular shaped
Levallois flakes, they are included in the forthcoming tool discussion, since they are often categorized as tools in other site assemblages. The remaining Levallois flakes were classified as either being simply Levallois, or in some cases as being flakes with Levallois elements. All flake types from the assemblage were considered for these counts (complete flakes, broken flakes, and flake fragments n=1143). Of the 1143 available flakes, a total of 246 flakes or 21.52% of the flake assemblage were found to have Levallois elements (see Table 5.9 below).

This relatively large percentage of Levallois flakes, 21.52%, indicates that the Levallois technique was being employed at Birimi, though the principle of equifinality does apply to Levallois flakes. Baumler (1995), Dibble and Bar-Yosef (1995), and Sellet (1995), among others caution that the best way to interpret and study the nature of Levallois is to focus on the process, rather than the end products or results. One of the best ways to do this is to study the cores of a Levallois assemblage. In hopes of confirming the application of the Levallois technique at Birimi, we turn our attention next to the core component of the Birimi MSA assemblage.

Table 5.9 Levallois Flakes

<table>
<thead>
<tr>
<th>Levallois Flakes</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maybe Levallois</td>
<td>79</td>
<td>32.11</td>
</tr>
<tr>
<td>Levallois</td>
<td>167</td>
<td>67.89</td>
</tr>
<tr>
<td>Total</td>
<td>246</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Core Analysis:

The Birimi assemblage contained 115 cores and core fragments (see Table 5.10). The Maximum Linear Dimension (MLD) and weight were both recorded for each core. The average weight of the cores was 11.2 g and the average MLD was 32.8 mm. The core's type or reduction strategy was also recorded.

The majority of the cores, 78.26%, were informal amorphous globular cores. Some of the cores did appear to be Levallois or have Levallois elements. In total 15.65% of the cores may have been used to create Levallois flakes. The linéal/ préférentiel Levallois cores were most likely used to maximize the size of the flakes being detached, whereas the récurrent Levallois cores would have been used to maximize the number of flakes being detached (Andrefsky 2005:155). A small percentage of the cores, 2.61%, presented with bipolar battering.

The remaining cores were discoid cores, which embodied only 3.48% of the core total. Discoid cores are similar to Levallois cores in that they are prepared cores that offer predetermined flakes often in a centripetal pattern using a hard hammer percussion technique. Two main criteria separate Levallois and discoid flaking methods (see Figure 5.5 below). (1) With the discoid flaking method, flakes are detached from a core at an oblique angle with respect to the theoretical plane of intersection between the two core surfaces, as opposed to a parallel detachment plane in the Levallois method. And (2) a hierarchical relationship between the two surfaces of a core does not exist with the discoid
method, whereas with the Levallois method the two core surfaces are hierarchically related (Chazan 1997; Terradas 2003:21). However, Terradas (2003) finds that these criteria are not necessarily inherent to the discoid flaking method when considering all the variable models, though these criteria are widely documented in archaeological contexts for the classic characterization of discoid.

Table 5.10 Absolute and Relative Frequencies for Core Types

<table>
<thead>
<tr>
<th>Core/Core Fragment Types</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linéal Levallois</td>
<td>12</td>
<td>10.43</td>
</tr>
<tr>
<td>Maybe Linéal</td>
<td>3</td>
<td>2.61</td>
</tr>
<tr>
<td>Récurent Levallois</td>
<td>2</td>
<td>1.74</td>
</tr>
<tr>
<td>Maybe Récurent</td>
<td>1</td>
<td>0.87</td>
</tr>
<tr>
<td>Discoid</td>
<td>4</td>
<td>3.48</td>
</tr>
<tr>
<td>Bipolar</td>
<td>3</td>
<td>2.61</td>
</tr>
<tr>
<td>Informal</td>
<td>90</td>
<td>78.26</td>
</tr>
<tr>
<td>Total</td>
<td>115</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Although only a small number of cores were recovered overall, and an even smaller number of them represented Levallois cores, it is now possible to confirm that the Levallois technique was practiced at Birimi, along with the discoid technique, and possibly a bipolar method. However, both the large count of amorphous cores (78.26% of the core assemblage) and the large number of informal flakes (78.48% of all flakes) suggest that the MSA people at Birimi preferred informal flake technologies to any other method.
Figure 5.5 Comparison of the Levallois and Discoid Flaking Methods (taken from Chazan 1997: Figure 5).
Tool Analysis:

The tools from Birimi were first examined and analyzed individually, and then classified into a descriptive typology. Following the Birimi typological definitions outlined in Chapter 4 adapted from Bordes' (1961) typology, 113 tools were identified and classified into 19 types. Table 5.11 below expresses the tool type frequencies. The majority of the tool assemblage was comprised of only five types, blades, notches, denticulates, Levallois points, and single scrapers, which together accounted for 68.13% of the tools. In the opposite extreme, 11 tool types occurred relatively infrequently, accounting for only 16.78% of the entire tool assemblage.

Table 5.11 Absolute and Relative Frequencies for the Tool Types of Birimi

<table>
<thead>
<tr>
<th>Tool Types</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retouched Levallois Points</td>
<td>1</td>
<td>0.88</td>
</tr>
<tr>
<td>Naturally Backed Knives</td>
<td>1</td>
<td>0.88</td>
</tr>
<tr>
<td>Scrapers on the Interior Surface</td>
<td>1</td>
<td>0.88</td>
</tr>
<tr>
<td>End-Notched Pieces</td>
<td>1</td>
<td>0.88</td>
</tr>
<tr>
<td>Racloirs-Denticulés</td>
<td>1</td>
<td>0.88</td>
</tr>
<tr>
<td>Pseudo-Levallois Points</td>
<td>2</td>
<td>1.77</td>
</tr>
<tr>
<td>Convergent Scrapers</td>
<td>2</td>
<td>1.77</td>
</tr>
<tr>
<td>Alternate Scrapers</td>
<td>2</td>
<td>1.77</td>
</tr>
<tr>
<td>Perçois</td>
<td>2</td>
<td>1.77</td>
</tr>
<tr>
<td>Bifaces</td>
<td>3</td>
<td>2.65</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>3</td>
<td>2.65</td>
</tr>
<tr>
<td>Endscrapers</td>
<td>5</td>
<td>4.42</td>
</tr>
<tr>
<td>Déjeté Scrapers</td>
<td>5</td>
<td>4.42</td>
</tr>
<tr>
<td>Double Scrapers</td>
<td>7</td>
<td>6.19</td>
</tr>
<tr>
<td>Blades</td>
<td>11</td>
<td>9.73</td>
</tr>
<tr>
<td>Notches</td>
<td>16</td>
<td>14.16</td>
</tr>
<tr>
<td>Denticulates</td>
<td>16</td>
<td>14.16</td>
</tr>
<tr>
<td>Levallois Points</td>
<td>17</td>
<td>15.04</td>
</tr>
<tr>
<td>Single Scrapers</td>
<td>17</td>
<td>15.04</td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>100.00</td>
</tr>
</tbody>
</table>
The Birimi tool typology, like Bordes’ Paleolithic typology before it, contains a large number of scraper types. Other typologies do not emphasize the same variations in scrapers and scrapers are instead organized into one or two types. Figure 5.6 above demonstrates the high rate of scrapers found in the Birimi assemblage, while also separating out the more nuanced types. This offers a visualization for both kinds of typologies, those that differentiate scraper types and those that prefer one categorization for this form of retouched tool. As a whole, scrapers embody 35% of the entire tool assemblage, and when taken
together, they are by far the most numerous tool type. Appendix A offers the lateral edge shape recorded for scraper types.

*Spatial Distribution Analysis:*

The location of the MSA artifacts was analyzed for patterned land use. Figure 5.7 is a site map of Birimi showing the coordinate grid system used for artifact provenience. Figure 5.8 is a grid map demonstrating the spatial distribution and density for all MSA artifacts that were assigned a coordinate (n=1,259 artifacts). The artifact types were examined individually to determine if they varied widely from this overall artifact distribution. Figures 5.9-5.11 illustrate the distribution of MSA artifacts by artifact type. The distribution of artifacts by type is shown to match the general distribution of all MSA artifacts at Birimi. From this it may be inferred that there was no site specialization at Birimi, at least as far as the MSA lithics are concerned. All types are concentrated in a similar pattern that is widespread throughout the southeast portion of the site. The largest density of artifacts was found to occur in a 20 by 20 meter square located between 80-100 East and 60-80 South on the coordinate site map. Although a large concentration of artifacts occurred here, all major types were present, and similar concentrations occurred nearby, suggesting that this 20 by 20 meter square is not a special lithic processing or activity area.
Figure 5.7 Site Map of Birimi
Figure 5.8 Density and Distribution of MSA Artifacts at Birimi

Figure 5.9 Density and Distribution of MSA Flakes at Birimi
Figure 5.10 Density and Distribution of MSA Tools at Birimi

Figure 5.11 Density and Distribution of MSA Cores at Birimi
Now that the nature and technology of the Birimi MSA assemblage has been explored in depth, the possibility that this assemblage reveals modern human behavioral traits will be addressed. As discussed in Chapter 2, there are many signatures of modern human behavior, and such signatures appear at different times and in different regions; behavioral modernity was a gradual process across the globe. Technological complexity, symbolism and style are three ideal indicators of behavioral modernity that are arguably present in the Birimi MSA assemblage.

Technological complexity is in and of itself an indicator of modern human behavior because it implies the presence of social learning and modern cognition (McBrearty 2003; Schlanger 1996). The Levallois technique is technologically complex. The special preparation of the core and the predetermined mental planning and organization needed to visualize and execute desired flake detachment reveal modern human behavior (Schlanger 1996). The ability to envision a desired end goal, construct a mental map to accomplish that goal, and adapt the predetermined mental plan as needed due to error or unpredictable circumstances, such as imperfect raw material, indicates exceptional intellectual abilities. The complexity of the Levallois technique and its widespread practice infers that it was a technique that was passed through social learning, either through experimental learning, visual or social learning, or even through verbal instruction.
The number of cores, flakes, and Levallois points recovered from Birimi was 11.21% of the entire assemblage. This percentage increases if flakes and cores that expressed Levallois elements, but could not be definitively recorded as Levallois are included. Although unstandardized flakes and amorphous cores were found in larger quantities across the site, the mere presence of Levallois technology in this quantity implies that the MSA people of Birimi knew and practiced the Levallois method and had the mental and social capacity to do so.

Technological complexity was also expressed by the people of Birimi in their tool assemblage. Of particular interest for the Birimi tool assemblage are two well-formed bifacial projectile points. The first projectile point is whole in nature and can be seen in Figure 5.12 below. The general form is lanceolate and the blade form is lanceolate with smooth edges. The basal edge is convex without a haft. The cross section is thin lenticular. There is no stem, but there is random flaking on the surface. The point has been furthered modified by grinding on the lateral edges.

The second projectile point (Figure 5.13) is fragmentary on the distal end. Its general form is also lanceolate, but its blade form is convex with serrated edges. The basal edge of this specimen is also convex and without a haft. The cross section is thick lenticular. And like the other point, this specimen lacks a stem and presents with random flaking on both surfaces. No grinding was present on this partial point.
Figure 5.12 Projectile Point BM96-523

Special purpose tools such as projectiles are considered technologically complex and a signature of modern human behavior (McBrearty and Brooks 2000). These points are carefully made, relatively thin, and rather symmetrical. They would be the appropriate size for thrusting or throwing spears, though their function is not definitively known.
Figure 5.13 Projectile Point BM96-522

Projectile points also have the potential to transmit regional, temporal, symbolic, or stylistic information (see Chapter 2). Symbolism and style are two related traits that signify behavioral modernity. Style allows for information to be exchanged, and in the process is representing something beyond itself, which is the definition of a symbol—“anything that in some way refers to or represents
something beyond itself” (Mellars 1996:369). Projectile points are thought to encode stylistic information for two main reasons: (1) point design is constrained by function, so successful designs tend to be replicated, and (2) the sharing or exchanging of points within a group imposes acceptable design limits (McBrearty and Brooks 2000:498). Since there are still wide gaps in the MSA record for the African continent as a whole, detailed maps of local point styles and their boundaries are not available, but regional styles are recognized (see Figure 5.14 below).

The Lupemban industry is found primarily in Central Africa, though it has been found as far south as Namibia and as far east as the Lake Victoria region (McBrearty and Brooks 2000:499). Lanceolate bifacial points are characteristic of the Lupemban industry, and the two bifacial projectile points from Birimi closely resemble the shape of Lupemban lanceolate points, which suggests a possible overlap between the Central African regional point style and a West African point style. The outstanding difference between the two styles is that the Lupemban lanceolate points can be quite large, sometimes exceeding 30 cm in length, whereas the two points from Birimi were both less than 10 cm in length. Naturally, the two points from Birimi do not offer enough comparative data to determine if these West African points are actually part of the same Lupemban Central African regional style, a variation of it, or something entirely different, but the similarity in shape is intriguing. As more data is collected from other West African and Central African sites a better picture of regional point styles will develop. Thus, in addition to being technologically and cognitively complex, the
creation of these points may also signify behavioral modernity through regional style.

The presence of the technologically complex Levallois technique and projectile points, as well as the possible presence of symbolism through regional point style all indicate that the people of Birimi were behaviorally modern during the MSA. However, it is important to note that this is not unexpected given the late date of the Birimi site at 30,000-40,000 years ago (Casey 2003; Casey et al 1997; Hawkins et al. 1996; Hawkins et al 2001; Quickert et al 2003). In fact, the roots of behavioral modernity are expressed quite early in the African record, 200,000 years ago or more, and continue to appear more and more frequently as the MSA progresses (McBrearty and Brooks 2000).

Researchers may question then, why the Levallois technique persisted relatively unchanged for hundreds of thousands of years and why it was so widely employed across three continents, namely, Africa, Europe, and Asia (Rolland 1995: 334). Does this indicate that the MSA is a static period in technological development? These questions need to be evaluated in conjunction with the rest of the Stone Age person’s toolkit and technology, and have two primary answers: (1) The Levallois technique was employed again and again because it was a useful and a working technique; and (2) the MSA toolkit varies in technology by region sometimes incorporating Levallois flakes and tools alongside more site or regionally specific tools. The retention of the Levallois technique throughout the MSA and into the early LSA does not imply that practitioners of this method lacked fully modern cognitive abilities, but rather this
was simply one aspect of their technology that continued to be useful especially in conjunction with other tools that were more specialized like the Central African Lupemban projectile points, or the geometric microliths of the Howieson’s Poort industry from South Africa.

Figure 5.14 Map of Distribution of Point Styles in the African MSA (taken from McBrearty and Brooks 2000: Figure 5).
5.3 A COMPARISON OF THE MSA AT BIRIMI TO THE MSA OF WEST AFRICA

It is difficult to make meaningful comparisons between the MSA lithics from Birimi with those from other West African sites because of the paucity of analyzed and published sites, and a lack of consistency between those that are available. Thus the picture of the West African MSA, and Birimi’s place within it, can only be painted with broad strokes.

In order to start the conversation of how Birimi may compare to other West African MSA sites, six sites with large collections and available data were selected. For the sake of comparison and conciseness, simplified broad classes are used. This involved collapsing some of the sites’ artifact classes into one overarching class, for example Birimi’s seven scraper types were simply reclassified into one type labeled “scraper”. The six sites selected for comparison to Birimi include: Asokrochona, Tema West I, Tema West II, Mai Lumba, Tibchi, and Zenabi. The first three are found in Ghana and described by Nygaard and Talbot (1984), while the last three are found in Nigeria and described by Allsworth-Jones (1986). These sites were introduced in Chapter 2.

Asokrochona and Tema West I mirror each other in stratigraphy and in artifact composition (see Tables 5.12-5.14). At Asokrochona the MSA layer overlies Acheulean materials and underlies meso-neolithic ones. Nygaard and Talbot (1984) attribute both sites to the Sangoan Industrial Complex, for their tools include typical Sangoan artifacts like scrappers, knives, notches, picks, core axes, choppers, denticulates, and bifaces. Some bipolar cores and discoidal
cores are present, though the majority of the cores seem to be amorphous. No Levallois flakes or cores have been found (Nygaard and Talbot 1984: 30,32). They are both considered to be extensive workshop sites and were likely occupied for long spans of time. Tool production was important at these sites, with the majority of tools being made from cores, rather than flakes (Nygaard and Talbot 1984: 31). The most common raw material used was vein quartz. Although these two sites have not been directly dated, the Nungua Formation, which caps the artifacts, has been dated to 13,000 to 25,000 B.P. (Nygaard and Talbot 1984: 31). These late dates may seem surprising at first, but as more MSA sites are uncovered and investigated (for example, the Tiemassas site discussed in Chapter 3) these dates are consistent with a persistent MSA in West Africa.

Tema West II is somewhat different than Asokrochona and Tema West I, though related. The artifacts from Tema West II are typically smaller than those at Asokrochona and Tema West I, and rather than vein quartz, the people at Tema West II commonly used pebble quartz (Nygaard and Talbot 1984: 32). The Tema West II assemblage differs in artifact composition compared to the other two, with spheroids, choppers, and core-scrappers being the most common tool types (see Table 5.12). Tema West II also contains some artifact types that are not present at Asokrochona or Tema West I, such as a tanged point, a tanged scraper, and Levallois flakes. Tema West II dated tentatively between 20,000 and 25,000 B.P.
In comparison to these three sites from Ghana, Birimi lacks the heavy-duty component related to Sangoan industries. Birimi is primarily a flake-tool industry rather than a core-tool industry, and has a strong Levallois component. Birimi’s MSA materials were also primarily made on siliceous mudstone.

Mai Lumba, Tibchi, and Zenabi are found between Kano and Jos in Nigeria. All three were unearthed as a result of industrial mining, and subsequently site condition and recovery were not ideal. Dates for the sites are also questionable due to erosion. However, the MSA status of the sites is not questioned given the technologies and artifacts recovered (see Tables 5.12-5.14). Allsworth-Jones (1986: 160) offers summary statistics for these three sites using a Bordean typology. An examination of the artifact composition for these three sites shows both similarities and differences. All three assemblages are primarily flake-tool assemblages. Levallois blades and cores are present at all three sites, though at Mai Lumba the Levallois elements are represented in higher quantities. The largest core class represented was discoidal cores (Mai Lumba 46.79%, Tibchi 42%, and Zenabi 36.36%). The main raw material employed at these sites was rhyolite.

These three MSA Nigerian sites were more similar to the MSA at Birimi than any of the MSA sites in Ghana. The Nigerian assemblages and Birimi’s assemblage represent flake-tool industries with Levallois components. Mai Lumba, Tibchi, and Zenabi, have similar concentrations of bifaces, scrapers, and Levallois cores when compared to Birimi. However, unlike Mai Lumba, Tibchi, and Zenabi, Birimi’s largest core class was amorphous cores (78.26%), rather
than discoidal cores (3.48%). Birimi also had higher concentrations of
dENTICULATES and notches when compared to these three sites (see Table 5.12
below).

There are other prominent sites that warrant comparisons in West Africa,
most notably a complex of open-air sites at Ounjougou on the Bandiagara
plateau in the Dogon country of Mali described in Chapter 2. However, the
materials from Ounjougou are still being analyzed and exact artifact composition
counts are not yet available (see Soriano et al 2010: 5). These sites offer one of
the most significant locations where MSA research is being carried out in West
Africa today with surface finds and stratified artifacts being recovered. The oldest
MSA occupations occur about 150,000 years ago and a more numerous
concentration of MSA occupations occur between 80,000 and 25,000 years ago
(Soriano et al 2010). Levallois and discoidal elements as well as blades and
bifacial foliates are present. Interestingly, bipolar debitage and large, heavy
scrapers are found in similar stratigraphic positions, though they have yet to be
directly associated except on the surface (Soriano et al 2010: 8). The majority of
lithic artifacts from Ounjougou were produced from quartz and quartzitic
sandstone raw materials. This data will be of great comparative interest in the
future when artifact counts are known.
Table 5.12 Tool Composition for Seven West African MSA Sites

<table>
<thead>
<tr>
<th>Artifact Types</th>
<th>Birini</th>
<th>Asokrochona</th>
<th>Tema West I</th>
<th>Tema West II</th>
<th>Mai Lumba</th>
<th>Tibichi</th>
<th>Zenabi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>(a) Tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levallois Blades</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>18.07%</td>
<td>4</td>
</tr>
<tr>
<td>Levallois Points</td>
<td>17</td>
<td>15.04%</td>
<td>-</td>
<td>-</td>
<td>11</td>
<td>13.25%</td>
<td>-</td>
</tr>
<tr>
<td>Pseudo-Levallois Points</td>
<td>2</td>
<td>1.77%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Retouched Levallois Points</td>
<td>1</td>
<td>0.88%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Awls/Bores/Perçoirs</td>
<td>2</td>
<td>1.77%</td>
<td>9</td>
<td>1.28%</td>
<td>3</td>
<td>3.26%</td>
<td>-</td>
</tr>
<tr>
<td>Bifaces</td>
<td>3</td>
<td>2.65%</td>
<td>8</td>
<td>1.14%</td>
<td>3</td>
<td>3.26%</td>
<td>1</td>
</tr>
<tr>
<td>Blades</td>
<td>11</td>
<td>9.73%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Burins</td>
<td>-</td>
<td>-</td>
<td>101</td>
<td>14.41%</td>
<td>11</td>
<td>11.96%</td>
<td>6</td>
</tr>
<tr>
<td>Choppers</td>
<td>-</td>
<td>-</td>
<td>101</td>
<td>14.41%</td>
<td>11</td>
<td>11.96%</td>
<td>6</td>
</tr>
<tr>
<td>Core Axes</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Denticulates</td>
<td>16</td>
<td>14.16%</td>
<td>9</td>
<td>1.28%</td>
<td>4</td>
<td>4.35%</td>
<td>-</td>
</tr>
<tr>
<td>Knives</td>
<td>1</td>
<td>0.88%</td>
<td>7</td>
<td>1.00%</td>
<td>3</td>
<td>3.26%</td>
<td>1</td>
</tr>
<tr>
<td>Limaces</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Notches</td>
<td>17</td>
<td>15.04%</td>
<td>21</td>
<td>3.00%</td>
<td>3</td>
<td>3.26%</td>
<td>-</td>
</tr>
<tr>
<td>Picks</td>
<td>-</td>
<td>-</td>
<td>35</td>
<td>4.99%</td>
<td>4</td>
<td>4.35%</td>
<td>1</td>
</tr>
<tr>
<td>Pointed Tools</td>
<td>-</td>
<td>-</td>
<td>47</td>
<td>6.70%</td>
<td>12</td>
<td>13.04%</td>
<td>5</td>
</tr>
<tr>
<td>Racleirs-Denticulés</td>
<td>1</td>
<td>0.88%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Scrapers</td>
<td>39</td>
<td>34.51%</td>
<td>404</td>
<td>57.63%</td>
<td>47</td>
<td>51.09%</td>
<td>8</td>
</tr>
<tr>
<td>Spheroids</td>
<td>-</td>
<td>-</td>
<td>46</td>
<td>6.56%</td>
<td>2</td>
<td>2.17%</td>
<td>9</td>
</tr>
<tr>
<td>Tanged Point</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2.22%</td>
<td>-</td>
</tr>
<tr>
<td>Tanged Scraper</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>17</td>
<td>2.22%</td>
<td>-</td>
</tr>
<tr>
<td>Miscellaneous Modified Tools</td>
<td>3</td>
<td>2.65%</td>
<td>9</td>
<td>1.28%</td>
<td>-</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>100.00%</td>
<td>701</td>
<td>100.00%</td>
<td>92</td>
<td>100.00%</td>
<td>45</td>
</tr>
</tbody>
</table>
Table 5.13 Core Composition for Seven West African MSA Sites

<table>
<thead>
<tr>
<th>Artifact Types</th>
<th>Birini</th>
<th>Asokrochona</th>
<th>Tema West I</th>
<th>Tema West II</th>
<th>Mal Lumba</th>
<th>Tibichi</th>
<th>Zenabi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>(b) Cores</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amorphous/irregular</td>
<td>90</td>
<td>78.26%</td>
<td>756</td>
<td>84.85%</td>
<td>97</td>
<td>80.17%</td>
<td>131</td>
</tr>
<tr>
<td>Bipolar</td>
<td>3</td>
<td>2.51%</td>
<td>7</td>
<td>0.79%</td>
<td>2</td>
<td>1.65%</td>
<td>4</td>
</tr>
<tr>
<td>Discoidal</td>
<td>4</td>
<td>3.48%</td>
<td>68</td>
<td>7.63%</td>
<td>1?</td>
<td>0.83%</td>
<td>6</td>
</tr>
<tr>
<td>Levallois</td>
<td>14</td>
<td>12.17%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Levallois-like</td>
<td>4</td>
<td>3.48%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pyramidal</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unifacially Trimmed</td>
<td>-</td>
<td>-</td>
<td>60</td>
<td>6.73%</td>
<td>21</td>
<td>17.36%</td>
<td>36</td>
</tr>
<tr>
<td>Initial/Prepartory</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1-and2-platform flake-blade</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>115</td>
<td>100.00%</td>
<td>891</td>
<td>100.00%</td>
<td>121</td>
<td>100.00%</td>
<td>192</td>
</tr>
</tbody>
</table>

Table 5.14 Flake Composition for Seven West African MSA Sites

<table>
<thead>
<tr>
<th>Artifact Types</th>
<th>Birini</th>
<th>Asokrochona</th>
<th>Tema West I</th>
<th>Tema West II</th>
<th>Mal Lumba</th>
<th>Tibichi</th>
<th>Zenabi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>(c) Flakes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levallois Flakes</td>
<td>246</td>
<td>21.52%</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>0.63%</td>
<td>46</td>
</tr>
<tr>
<td>Flakes</td>
<td>897</td>
<td>78.48%</td>
<td>7125</td>
<td>100.00%</td>
<td>1897</td>
<td>100.00%</td>
<td>940</td>
</tr>
<tr>
<td>Total</td>
<td>1143</td>
<td>100.00%</td>
<td>7125</td>
<td>100.00%</td>
<td>1897</td>
<td>100.00%</td>
<td>946</td>
</tr>
</tbody>
</table>
Overall, the MSA in West Africa is poorly understood and only vaguely described. Many reported MSA sites are thought to contain Sangoan or Lupemban elements, which suggests a link to East and Central Africa (Davies 1967; Nygaard and Talbot 1984). Birimi lacks these elements, though the bifacial foliates recovered from Birimi do mimic the shape of Lupemban foliates, yet not their large size. It has been reported that the MSA of Ghana is more like the Middle Paleolithic of northern Africa than industries elsewhere (MacDonald 1997:332); this is similar to Allsworth-Jones’ (1986) conclusions for the MSA in Nigeria. The artifact composition at Birimi was most similar to the artifact composition from the discussed Nigerian sites, and yet there were still outstanding differences. As it stands, more research needs to be completed before full picture of Birimi’s place in the West African MSA can emerge.

5.4 A COMPARISON OF THE MSA AT BIRIMI TO THE GENERAL MSA OF AFRICA

The MSA in Africa likely begins at least 300,000 years ago and continues to 20,000 years ago or later in some regions. At the beginning of the MSA heavy duty lithic tools and cores are used. The widespread use of Sangoan artifacts, often tied to earlier Acheulian types from the ESA, are evidence of this. As the MSA continues, a technological shift is visible. Stone workers transition to prepared core technologies and gradually produce smaller and a greater variety of tools and artifacts. These prepared core techniques are employed across the continent and through time. Table 5.15 helps to emphasize differences and
similarities in the MSA around Africa by highlighting the presence and absence of cultural material by region. This table also compares Birimi to the general MSA of Africa.

Birimi’s MSA is largely similar to the greater African MSA. Even though the MSA component of the Birimi site occurs quite late in the African record, the lithic reduction strategies employed at Birimi, namely the Levallois technique, discoidal flaking, and opportunistic flaking are still similar to what researchers find across the continent during this time period. However, the bifacial points at Birimi resemble Lupemban points in shape, though not in size, and may indicate a regional point style tying the West African MSA to the Central African MSA. These technologically complex points and this regional style are evidence of modern human behavior.

In fact, modern human behavior is found across the continent even earlier than is found at Birimi. Regional variability in tool and artifact types show regional cultural style, and style is a form of symbolic expression, which in turn is evidence of modern human behavior. This variability can be seen across the continent. Examples of technological style can be seen in South Africa in the Still Bay and Howieson’s Port industries, found to date between 77,000 and 59,000 years ago (Soriano et al 2015). Style and technological complexity is also demonstrated in North Africa by the Aterian dating between Marine Isotope Stage 6 (c. 191-130,000 years ago) to Marine Isotope Stage 3 (c. 57-29,000 years ago) and in Central Africa by the Lupemban dating between 40,000 and 15,000 years ago (Taylor 2014: 1212; Scerri 2013: 2).
Table 5.15 Regional Date Comparison for the MSA and Birimi (McBrearty and Brooks 2000; Mitchell 2002; Taylor 2014; Willoughby 2007).

<table>
<thead>
<tr>
<th>Dates</th>
<th>Birimi</th>
<th>West Africa</th>
<th>Central Africa</th>
<th>North Africa</th>
<th>East Africa</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-40kya</td>
<td></td>
<td>Not concretely dated (*300-13kya)</td>
<td>Not concretely dated (*300-13kya)</td>
<td>230kya-?</td>
<td>&gt;276-40kya</td>
<td>300-22kya</td>
</tr>
</tbody>
</table>

(a) Lithics

**Sangoan**
(Heavy-duty: Picks, Core Axes, Choppers, Core Scrapers)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>---</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Lupemban**
(Large Foliate Points, Core Axes, Small Points, Blades)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>?</td>
<td>X</td>
<td>X</td>
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<td>X</td>
</tr>
</tbody>
</table>

**Lupemban-Tshitolian**
(Foliate points, Core Axes, Backed Pieces, Tranchets)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
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<tr>
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<td>---</td>
<td>X</td>
<td>---</td>
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</tr>
</tbody>
</table>

**Aterian/Mousterian**
(Levallois Component, Tanged Points, Bifical Foliates)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
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<td>---</td>
<td>X</td>
<td>---</td>
<td>X</td>
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</tr>
</tbody>
</table>

**Still Bay**
(Bifacial Foliate or Lanceolate Points)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
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</tbody>
</table>

**Howieson’s Poort**
(Blades, Backed Tools, Geometric Segments)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
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</tr>
</tbody>
</table>

**Levallois**
(Prepared Cores, Flakes, and Tools)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Blades**

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Specialized Lithics**
(Heat Treated, Pressure Flaked, Etc.)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

(b) Other Artifacts

**Bone Tools**

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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**Beads**

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**Ochre**

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**Wood Throwing Stick**

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(c) Human Skeletal Remains

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**Burial**

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**Cut Remains**
(Mortuary Practice?)

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Beyond lithic industries and complex stone tools, behavioral modernity and variable technology complexity can be seen in recovered organic artifacts. The use of cultural materials like ochre, bone tools, shell beads, and a wooden throwing stick all indicate a dynamic use of the environment and materials. Some of these materials are found early in the record, like the barbed and unbarbed bone points found at the Katanda site in Central Africa dating to about 90,000 years ago (Yellen et al 1995). These bone points were found in association with fish bones, primarily catfish, and indicate complex subsistence specialization and advanced technology.

Funerary practices are also seen as evidence for symbolic behavior. Several regions have produced evidence of mortuary practices namely North, East, and South Africa. In North Africa at the Taramsa 1 site in Egypt, dated between 50,000 and 80,000 years ago, a burial of an anatomically modern human child was found (Vermeersch et al. 1998). In South Africa at the Border Cave site, a burial of an infant skeleton was also discovered and is estimated to be even older dating between 90,000 and 100,000 years old (McBrearty and Brooks 2000; Mitchell 2002). Modern human remains are also present in South Africa at Klasies River. The human remains are fragmentary, have evidence of cut marks and burning, and may represent evidence for cannibalism (McBrearty and Brooks 2000:520; Mitchell 2002:74). And in East Africa, Tyron and Faith (2013) offer evidence of mortuary practices at a MSA site in the Bouri Formation, Ethiopia. Cut and polish marks were found on a hominin skull dated between 154,000 and 167,000 years ago.
Overall, a complete picture of the African MSA is still lacking, but sites from around the continent including the Birimi site demonstrate that the MSA was a dynamic time period with a wide variety of complex and behaviorally modern technologies and behaviors present.

5.5 SUMMARY

This chapter presented the analysis and results for the Birimi MSA assemblage. This research found that the Birimi MSA lithics were part of a flake-tool assemblage and were largely created using hard hammer percussion. All reduction stages are present at Birimi in significant quantities. From this it may be inferred that all stages of lithic manufacture and reduction took place at Birimi. The people of Birimi created a variety of flake sizes, some quite large. The average flake size was 34.73 mm in length, 31.66 mm in width, 9.67 mm in thickness, and 11.26 g in weight. Complex and flat platforms were the two most prevalent platform types, and they were present in similar quantities. Artifact modification was present, though it was not the norm; 83.72% of the assemblage did not present with modification. Of those that did, three general types of modification were identified: usewear, retouch, and grinding. The majority of flakes and cores were created using an informal opportunistic approach, though the people of Birimi did have the capacity for practicing more formal technologies. Complex MSA techniques were found to be present in this assemblage. Levallois flakes and cores and discoidal cores were represented in this assemblage. The number of tools recovered was small (6.37% of the
assemblage), but the variation in tool types was quite large—19 different types were recovered including bifaces, Levallois points, blades, denticulates, notches, and a variety of scrapers.

This chapter also demonstrated that MSA lithic artifacts at Birimi revealed the presence of modern human behavior in two ways: (1) through technological complexity, specifically through the presence of Levallois technology and complex bifaces, and (2) through the presence of style, which has been argued to be an extension of symbolism. Style was argued to be present in the bifaces recovered. The bifaces appear to mimic the African Lupemban style in shape, though the Birimi points were notably smaller in size than true Lupemban points. Although regional point comparison would be more concrete if the sample size at Birimi was greater and if the Birimi points were a perfect match to typical Lupemban points in both size and shape, it is possible that these points are a West African regional variation of the Central African Lupemban. However, more data is needed before solid conclusions or further comparisons can be made.

Finally, this chapter offers some initial comparisons of Birimi to several data rich MSA West African sites and to the African MSA in general. Birimi’s artifact composition was compared to six sites, three in Nigeria and three in Ghana. It was found that Birimi’s artifact composition most closely resembled that of three Nigerian sites, Mai Lumba, Tibchi, and Zenabi, but it was found to differ quite a bit to three Ghanaian sites, Asokrochona, Tema West I, Tema West II. The three MSA Ghanaian sites were attributed to the Sangoan Industrial Complex, an industry defined by heavy-duty tools, core axes, MSA debitage,
small scrapers, and pick-like artifacts (McBrearty and Tryon 2006: 260; Mitchell 2002: 63; Wurz 2013: 306). The Sangoan is often considered a transitional industry between the ESA and the MSA, for MSA technology moves from the heavy-duty core tools of the Acheulean to the more general flake-tool industries of the greater MSA. It is prudent to point out that at this stage site comparisons are only broadly made. Accurate intersite comparisons face many challenges including: a lack of consistency in the data recorded between sites, a paucity of data, typological differences, variations in classifications or definitions of artifact types, differences in raw materials, temporal differences, functional differences, and regional or local differences. Birimi is considered to belong to the late end of the African MSA and the general reduction strategies present namely, Levallois, discoidal, and opportunistic flaking techniques, are found throughout the African MSA geographically and temporally. However, the comparisons made here are broad are offered as way to open the discussion of Birimi’s place in the African and West African MSA.
CHAPTER 6
DISCUSSION AND CONCLUSIONS

This thesis broadened our view of the MSA in West Africa by analyzing and specifically describing the MSA lithic technology present at the multicomponent site of Birimi in Northern Ghana. Birimi is a significant site because it is one of the few dated MSA sites in West Africa, a region and time period plagued by poor site and artifact preservation, a lack of researchers, a paucity of published data, and an unreliable chronological framework. The importance of this thesis is two-fold. First, it offers a much-needed technological description that is well defined and facilitates easy intersite comparisons, and two, it highlights the variety and variation of approaches to MSA technology, which in turn speaks to the behavioral evolution of our species.

Several questions were posed in Chapter 1 that were designed to further our knowledge of the African MSA, especially its technological variation and behavioral complexity: (1) What is the nature of the MSA assemblage of Birimi?; (2) Does this assemblage reveal modern human behavior, and if so, how?; and (3) How does the MSA of Birimi compare to the greater MSA of Africa and to the MSA of West Africa in particular? Answers to these questions are significant, for they address gaps in the archaeological record of West Africa and are vital to furthering any discussion of the MSA.
6.1 BEHAVIORAL MODERNITY

The MSA is a period in African prehistory that encompasses a great time depth ranging from at least 300,000 years ago to as late as 20,000 years ago (Minichillo 2005; Opperman and Heydenrych 1990). It is during this period that *Homo sapiens* emerged in Africa. By 195,000-160,000 years ago our *Homo sapiens* ancestors had acquired anatomically modern skeletons. Although it is generally accepted that *Homo sapiens* were anatomically modern quite early, it is debated when these ancestors became behaviorally modern.

Some researchers suggest that behaviorally modern traits arrived suddenly and quite late in the record, 40,000-50,000 years ago (Klein 1995; Mellars and Stringer 1989). This dramatic behavioral shift is tied to a cognitive advancement, possibly due to language acquisition or other means. Since the earliest modern skeletons are found quite a bit earlier, this model constructs a time lag between anatomical modernity and behavioral modernity, leaving the impression that African *Homo sapiens* were behaviorally primitive. This model is often referred to as the “human revolution” model.

This model, coupled with comparisons of the African MSA to the European Paleolithic reinforces notions that our African ancestors are culturally primitive (Minichillo 2005; McBrearty and Brooks 2000). This was done historically when the MSA was first thought to be contemporaneous with the Upper Paleolithic, a period of time noted for great advances in technology and art including pottery, figurines, paintings, complicated lithics, and jewelry, whereas the MSA was thought to lack these accomplishments. Now the MSA is known to be
contemporaneous with the European Middle Paleolithic, and the two periods are often linked. Unfortunately, comparisons still often leave the impression that the MSA is culturally backwards, for the MSA has been painted as retaining the same technology for millennia even though humans were anatomically modern, whereas hominins present in the Middle Paleolithic were archaic human ancestors. These comparisons are wrought with problems, such as different regions are conflated, and the rich MSA sites, especially those in South Africa, are ignored. These comparisons perpetuate ideas that the MSA is stagnant and that Africa as a whole is primitive historically, especially when compared to Europe.

Other models suggest that this “human revolution” interpretation is flawed and stems from a profound Eurocentric bias that fails to take into account the actual scope and scale of the African archaeological record. Instead of presenting behavioral modernity as a rapid arrival of traits, or a “human revolution”, others believe that modern traits appear gradually in different regions and times in the African record (McBrearty and Brooks 2000; Stahl 2005). The MSA is not homogenous in time or space, nor is it stagnant technologically or behaviorally.

This thesis discussed these differing models. In Chapter 2, Eurocentric bias in Old World archaeology was tied to historical prejudices of the past and shown to be interlaced with the very creation of anthropology. The foundation of anthropology was tied to a preoccupation with the Other, an obsession that is present today. The problematic view that the people of the African MSA are
behaviorally primitive and culturally stagnant was also addressed. This thesis demonstrated that the African MSA is dynamic with numerous and varied technologies, and it is behaviorally complex with cognitively sophisticated technologies. In Chapter 3 regional differences and cultural styles of lithics were explored, like the Aterian and Mousterian industries of North Africa and the famed Still Bay and Howieson’s Poort of southern Africa. The mentioned use of advanced technologies like the prepared-core Levallois technique, pressure flaking, blade technology, and composite tools, coupled with symbolic behaviors or artifacts like mortuary practices, ochre, beads and ornaments substantiate this claim that the MSA is dynamic and technologically varied.

6.2 BIRIMI’S MSA ASSEMBLAGE

This thesis directly addressed these theoretical concerns as well as the questions outlined in Chapter 1 by studying the MSA lithics of Birimi. The MSA assemblage of Birimi consists largely of lithic artifacts made from siliceous mudstone. Individual Flake Analysis (IFA) was applied to the Birimi MSA assemblage and conducted on a macroscopic scale. IFA required the sorting of the artifacts into types followed by attribute analysis. This attribute analysis was also coupled with a typological approach for the tool class. The well-known Bordean typology was adapted for the Birimi MSA tools to facilitate easy intersite comparisons. IFA allowed for the morphology and technology examination of each specimen. This in turn lead to a clear and detailed description of the
assemblage, and delivered an analysis that lends itself to comparison, a priority for this understudied region.

This analysis revealed that the Birimi MSA lithics were part of a flake-tool assemblage and were largely created using hard hammer percussion. All reduction stages are present at Birimi in significant quantities. From this we may infer that the people of Birimi were not greatly concerned with conserving raw material or with its availability. Perhaps the raw material source, located 25km away, was sufficiently near to alleviate this concern. The people of Birimi created a variety of flake sizes, some quite large, but their flakes on average were 34.73 mm in length, 31.66 mm in width, 9.67 mm in thickness, and 11.26 g in weight. Complex and flat platforms were the two most prevalent platform types, and they were present in similar quantities. Some of the artifacts presented with modification, but the majority of them (83.72% of the assemblage) did not. Types of modification identified included usewear, retouch, and grinding. Complex MSA technologies were found to be present in this assemblage, particularly Levallois flakes and cores and discoidal cores, though the majority of flakes and cores present were created using an informal opportunistic approach. The number of tools recovered was small (6.37% of the assemblage), but the variation in tool types was quite large—19 different types were recovered including bifaces, Levallois points, blades, denticulates, notches, and a variety of scrapers.

This thesis addressed notions of Africans in the archaeological record as primitive by demonstrating that modern human behavior is indeed present in the MSA at Birimi. The Birimi MSA lithic assemblage indicates modern human
behavior in two ways: (1) through technological complexity, specifically through
the presence of Levallois technology and complex bifaces, and (2) through the
presence of style, which has been argued to be an extension of symbolism, a
criterion often used for indicating behavioral modernity. Style was argued to be
present in the bifaces recovered. Although there were only two bifaces, they
were reminiscent of the Central African Lupemban style in shape, though the
Birimi points were notably smaller in size than true Lupemban points. It is
possible that the size difference could be an additional regional or temporal
variation.

Finally, this thesis provides some initial comparisons of Birimi to several
data rich MSA West African sites, and opens the discussion of Birimi’s place in
the MSA. Birimi’s artifact composition was found to resemble that of three
Nigerian sites, Mai Lumba, Tibchi, and Zenabi, but it was found to differ quite a
bit to three other Ghanaian sites, Asokrochona, Tema West I, Tema West II,
which are part of the Sangoan Industrial Complex. This is not surprising given the
depth and breadth of the African MSA. But it must be noted that at this stage
comparisons are only broadly made. The MSA of Birimi was found to occur at the
late end of the period. The reduction strategies present at Birimi, namely the
Levallois technique, discoidal flaking, and opportunistic flaking are present widely
in the general African MSA both geographically and temporally, but the MSA
people of Birimi differentiated themselves from the greater continent and period
through complex regional point style.
In general, it is hard to make meaningful comparisons due to a large number of factors including: a lack of consistency in the data recorded between sites, a paucity of analyzed and published data, typological differences, variations in classifications or definitions of artifact types, differences in raw materials, temporal differences, functional differences, and regional or local differences. Some of these concerns may be mitigated by future work.

6.3 OPPORTUNITIES FOR FUTURE WORK

Western models and interpretations have long misrepresented the prehistoric record of Africa as stagnant and primitive. Descriptions and interpretations of the African MSA have fallen victim to Eurocentric bias partly as a result of research history and partly as a product of privileging the rich European archaeological record. The African record must be evaluated on its own terms using its own artifacts. When this is done, modern human behavior is seen to appear gradually, rather than suddenly. This in turn leaves us with the opportunity to study these behavioral adaptations on their own and determine what influenced their appearance.

A lack of research concentrating on the West Africa MSA is slowly being remedied. As more research is undertaken, more site data is published, and better methods and techniques are employed a fuller picture of the MSA will develop. Refined intersite and regional comparisons will follow filling in gaps surrounding the nature, order, and speed of behavioral adaptations in the MSA. As these gaps are closed and more information becomes available, Birimi’s
assemblage and this analysis may warrant a second look, especially the broad comparisons made to other West African sites and the general point style association given. This thesis is a step and my contribution to developing a fuller picture of the West African MSA and its people—modern people, our relatives.
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Henshilwood, Christopher S., and Benoît Dubreuil  

Henshilwood, Christopher S., and Curtis W. Marean  


Henshilwood, Christopher S., and Judith C. Sealey  

Hranicky, Wm Jack  

Iovita, Radu  

Isaac, Glynn  

Klein, Richard G.  

Klein, Richard G. and Kathyrn Cruz-Urife

Kooymen, Brian P.

Kowta, Makoto

Kuhn, Steven L.

Kuijt, Ian, William C. Prentiss, and David L. Pokotylo

Lemonnier, Pierre

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Liritzis, Ioannis with Ashok Kumar Singhvi, James K. Feathers, Gunther A. Wagner, Annette Kadereit, Nikolaos Zacharias, and Sheng-Hua Li
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Marean, Curtis W. and Zelalem Assefa

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Rosen, Steven A.
Sackett, James R.  

Scerri, Eleanor M. L.  

Schick, Kathy and Nicholas Toth  

Schindler, Bill and Jeremy Koch  

Schlanger, Nathan  

Sellet, Fédéric  

Sharon, Gonen, and Peter Beaumont  

Shott, Michael J.  
Singer, Ronald and Wymer, John J.

Soressi, Marie

Soriano, Sylvain with Michel Rasse, Chantal Tribolo, and Eric Huyssecom

Soriano, Sylvain with Paola Villa, Anne Delagnes, Ilaria Degano, Luca Pollarolo, Jeannette J. Lucejko, Christopher Henshilwood, and Lyn Wadley

Stahl, Ann B.


Stahle, David W., and James E. Dunn
Sullivan, Alan P. III, and Kenneth C. Rozen  

Taylor, Nicholas  

Terradas, Xavier  

Thackery, Anne I.  

Tixier, Jacques  

Tribolo, C. with M. Rasse, S. Soriano, and E. Huysecom  

Trouillot, Michel-Rolph  

Tryon, Christian A. and J. Tyler Faith  

Tryon, Christian A. and Sally McBrearty  
Vermeersch, P.M. with E. Paulissen, S. Stokes, C. Charlier, P. Van Peer, C. Stringer, and W. Lindsay

Vernot, Benjamin, with Serena Tucci, Janet Kelso, Joshua G. Schraiber, Aaron B. Wolf, Rachel M. Gittelman, Michael Dannemann, Steffi Grote, Rajiv C. McCoy, Heather Norton, Laura B. Scheinfeldt, David A. Merriwether, George Koki, Jonathan S. Friedlaender, Jon Wakefield, Svante Pääbo, and Joshua M. Akey

Wadley, Lyn


Whittaker, John C.

Wiessner, Polly


Willoughby, Pamela R.

Wurz, Sarah


Wynn, Thomas and Frederick L. Coolidge

Yellen, John E., with Alison S. Brooks, Els Cornelissen, Michael J. Mehlman, and Kathlyn Stewart
APPENDIX A
SCRAPER EDGE SHAPES

Table A.1 Single Scraper Lateral Edge Shape

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Table A.2 Double Scraper Lateral Edge Shapes

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Table A.3 Convergent Scraper Lateral Edge Shapes

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