Nabta Playa Black-topped pottery: Technological innovation and social change

Kit Nelson & Eman Khalifa

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Black-topped pottery is part of a ceramic tradition that represents important changes in the technological choices at Nabta Playa. It did not develop as an isolated phenomenon, but instead emerged within the context of climatic upheaval and broader cultural changes. New technologies that appeared included controlled-firing regimes, multiple-phased firings and the addition of surface treatments, as well as changes in the types of raw materials used and the incorporation of new forms. These multiple technological developments represented complex transformations in construction and production techniques that developed within a climate of environmental uncertainty and appeared simultaneously with other markers of social change.

This paper explores the various technological changes by comparing samples from the Middle Neolithic to the Late Neolithic periods recovered from sites in the Nabta Playa area (Fig. 1). The pottery assemblage found there offers an opportunity to explore a range of important modifications to pottery production methods because it includes ceramics from well-dated contexts. Using this assemblage, we explore the possible system in which these changes took place. We also seek to explain the rapid transformation from a once stable pottery regime maintained from the onset of pottery production until the end of the Middle Neolithic to the emergence of a new, widespread ceramic complex in the Late Neolithic.

The Neolithic at Nabta Playa

At approximately 11,000 to 10,000 years BP (uncalibrated), the globe witnessed the major climatic change known as the Younger Dryas (Rosen 2003). Nabta Playa in the Western Desert of Egypt was affected by these changes (Figs. 1 and 2). Today this area is known to be among the most arid parts of the Sahara Desert, receiving only an estimated 1 mm of rain per year (Wendorf and Schild 1980) or less (Haynes 1996). It has not always been such a hostile environment. Indeed, between 11,000 and 3,860 bp, the Nabta Playa area witnessed seven humid interphases that were interrupted by five arid phases (Wendorf and Schild 2001a). Excavations of the Holocene settlements at Nabta Playa revealed that between 9500 and 5000 radiocarbon years ago, the area received 100 to 200 mm of rainfall per year, making it more suitable for human occupation. The rainfall gathered in a series of lakes, including Nabta Playa, one of the largest in the region, with an estimated catchment area of 1500 km² (Wendorf and Schild 2001b). The earliest sites were located, as were many Palaeolithic sites in Egypt, around these large water resources (Brewer 2005). The lakes attracted humans and other animals and supported a subsistence base of hunting, gathering and in some cases, fishing (Smith 1984; Hassan 1998). During the last part of the Neolithic sequence at Nabta Playa, beginning around 4,500 bp, the climate began shifting towards the modern hyper-aridity (Hill 2001; Wendorf and Schild 2001a).
The archaeological record associated with these lake deposits includes sites that have defined through surface survey and excavation to be of various ages. These have been dated by associated radiocarbon dates (Schild and Wendorf 2001) as well as a ceramic sequence developed from a combination of stratigraphic deposits and associated radiocarbon dates (Nelson 2002d). Based on the Nabta Playa sequence, the Neolithic of this region has been divided into four phases: Early, Middle, Late and Final. The phases have been defined by similarities in the material culture and by the clustering of radiocarbon dates. Research has determined that there were humid phases resulting in the occupation of the region that alternated with dry interphases during which the area was abandoned (Wendorf and Schild 2001b).

The Early Neolithic, dating to approximately 10,000 to 7,500 bp, marks the re-entry of human inhabitants into Nabta Playa at the onset of the Holocene. This return to the area is associated with an intensification of plant gathering. There is variability in Early Neolithic habitation: some sites were for short-term usage, while others, especially towards the end of the phase, were larger and more permanent, with features such as houses, storage pits and wells.

The stone tools discovered are based on microlithic technology, and the stone tool assemblage is dominated by tools made from small bladelets (Wendorf and Schild 2001b). The earliest pottery at Nabta Playa dates between 9,800 and 8,000 bp, at least 1500 years before the appearance of plant domestication or sedentism (Zedeño 2002). Pottery shapes are restricted to large bowls, the majority of which have rocker-stamp decorations across the exterior surfaces (Nelson 2002c). Variability exists in the layout of the design of rocker-stamped impressions through time (Nelson 2002b), and M. Gatto has recognised regional variation in surface decoration that includes a limited set of impressed types for the Western Desert (2002; 2006a; 2006b). Petrographic analysis of the temper of the Early Neolithic pottery from Nabta Playa shows that it is limited to two parent source types: granodiorite and gneiss. This limited variability in pottery temper is interesting given the wide variety of possible materials available for temper in the region. The lack of variability suggests that they had already explored several options and settled on these tempers as meeting their needs in the early years of pottery production. The subsistence base for the Early Neolithic has come under scrutiny due to discussions concerning the presence of domesticated bovids (for a summary, see Gifford-Gonzalez 2005; also see Gautier 1984, 71; Hassan 2002; Mohammed-Ali 1984; Wendorf and Schild 1984; Wendorf et al. 1997). The evidence at Nabta Playa supports a diverse subsistence base of domesticated bovids and a variety of wild animals and plants (Gautier 2001).

The identification of a Middle Neolithic phase at Nabta Playa is based on scant evidence. Few sites are present, and information about this period is primarily derived from the excavations of a small sample of pits and hearths as well as a single stratigraphic layer at Site E-75-8. Dates derived from these excavations range from 7,300 to 6,500 bp (Wendorf and Schild 2001b). The pottery of this period includes bowls with smoothed-over rocker-stamped or roughly smoothed exteriors. Stone tools continue to be based on a microlithic technology, characterised only by a slight shift towards more flake tools, overturning the dominance of blade tools in the assemblage. The subsistence base is in part a continuation of the previous system, with the important addition of sheep/goats (Wendorf and Schild 2001a), animals
that would have expanded the degree of mobility of these mixed economy pastoralists. By the end of the Middle Neolithic, Nabta Playa witnessed a hyper-arid phase, which led to the abandonment of the area (Wendorf and Schild 2001b). The migrating groups are believed to have fled to the nearest permanent water resource in the region, the Nile River (Kobusiewicz 1992).

Following this arid phase, major changes occurred at Nabta Playa. The Ru’at El Baqar Late Neolithic (6,200–5,800 bp) and the Bunat Al Ansam Final Neolithic (5,400–4,800 bp) saw the rise of Nabta Playa as a ceremonial centre at which large stone constructions were erected (Wendorf and Schild 2001b).

The Late and Final Neolithic are better known by the larger academic community because they include features that have become famous: the calendar circle and megalithic alignments (Wendorf and Schild 2002). Great effort was put into these constructions with regard to both the labour involved and the astronomical knowledge required (Applegate et al. 2001; Applegate and Zedeño 2001; Wendorf and Krolik 2001; Wendorf and Malville 2001). Based on this, F. Wendorf and R. Schild argue that the creation of these features required a high level of complexity and social organization (2001a), and the clustering of these features has led them to refer to Nabta Playa as a ‘regional ceremonial centre’ (Wendorf and Schild 2002, 15). These complex features occur in a Late Neolithic landscape primarily composed of deflated, open-air hearths resulting from short-term use by pastoral groups. These habitation areas have provided information on the everyday material culture of this pastoral economy (Wendorf and Schild 2001a).

The material culture of the Late Neolithic diverges from that found in earlier assemblages. These changes include a shift in the predominance of blade and flake tools to tools made from side-blow flakes. This is visible in both the débitage and in the final tool forms (Nelson 2001b). The pottery also presents dramatic changes that continue through the Final Neolithic. This new ceramic complex includes the first thin-walled vessels with smoothed, burnished and/or slipped surfaces as well as the first appearance of Black-topped pottery (Nelson 2002d). During the course of the Final Neolithic, the ceramic complex expands to include Ripple-ware pottery.

**Previous research on Black-topped pottery**

Black-topped pottery is made by hand from a tempered or untempered paste and is characterised by a distinctive black lip. It is a marker of many cultures present at sites in the Western Desert. Although its presence in the Dakhleh Oasis region is reported as early as 7,120±90 bp (Hope 2002, 41), recent refinement of the chronology questions the association of this pottery type with these early dates (Warfe 2003; 2008). Its earliest occurrence in a good stratigraphic context comes from Nabta Playa, with a date of 5,810±80 bp (Table 1). Black-topped pottery is best known for its association with the Predynastic of Upper Egypt, beginning with the Badarian, during which it was a predominate type (Friedman 1994). It continues to be typical of pottery production during Naqada I and Naqada IIA–B periods in Upper Egypt, but becomes less common in Naqada IIC and appears to fall out of use by Naqada IID. Its production is revived in the Naqada III period when it is exclusively used for

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cult vessels of a specific shape (Sowada 1999).

It is difficult to determine the reason behind the production of Black-topped vessels. Several theories as to why it first developed have been postulated. W. Needler argues that Black-topped pottery originated as a special type of the polished red ware because both share the same surface treatment and forms (1984). The black top is also thought to imitate black-lipped gourd vessels that were heat-treated to prevent splintering around the cut edge (Arkell 1960; Lucas and Harris 1962). K. N. Sowada maintains that the makers of Black-topped pottery during the Early Dynastic (Naqada III) period adapted a colour scheme that reflected the vessels’ ritual functions (1999). She refers to the symbolic nature of colour use in Egyptian art in which red is the colour of chaos and death and black is the colour of the fertile land of Egypt and resurrection, suggesting that the two colours were combined to represent the contrast between life and death.

How Black-topped pottery fits into the larger picture of cultural change is a more complicated question. At Nabta Playa, the earliest examples are from Site E-75-8 located on the north-western edge of the lake, which yielded stratified deposits with alternating layers of cultural material and fossilised dune (Figs. 2 and 3). The first Black-topped pottery-bearing layer at E-75-8 is Layer 8 (Nelson 2001b) (Fig. 4), which is bounded by a Middle Neolithic context dated to 6,155 bp. Its first appearance is in conjunction with Red/Brownish wares that lack the blackened rim, but share the other features, including construction, material and surface treatment (Table 1) (Nelson 2002b; Zedeño 2002).

Red/Brownish ware is also present at Nabta Playa at site E-92-9, which has been dated to 6,000 bp, but without accompanying Black-topped pottery (Applegate and Zedeño 2001). The assemblage from this site is small, with only forty-five sherds, and the absence of Black-topped pottery may simply represent a sampling error. Nevertheless, this shows that the early phase for the complex of pottery in which Black-topped pottery first occurs is securely dated to around 6,000 bp and is present at multiple sites at Nabta Playa.

The presence of Black-topped pottery as part of a larger ceramic complex that shares general features is important. This is first because this combination of features represents broad changes in technology, which will be discussed in detail below, and second because this complex, although referred to by a variety of cultural names, including Badarian, Tasian and A-Group, appears to be a widespread phenomenon. Broadly defined, this ceramic complex includes Black-topped pottery, Ripple-ware and tulip-shaped vessels, together or in conjunction with other vessels that fall within the more general Red/Brown, Qussier Clastic and Olive wares (as described in Nelson 2002b). The extent of this complex includes the Nabta Playa area (Nelson 2002a), the adjacent Gebel Ramleh (Kobusiewicz et al. 2004), Dakhleh Oasis (in the culture described as Bashendi B in McDonald 2002), Kukur Oasis (Darnell and Darnell 2006), as far east as the Eastern Desert at Wadi Atulla (Friedman and Hobbs 2002), southwards to Khartoum (see, for example, Arkell 1949, pls. 91–100) and beyond. This ceramic complex replaces the rocker-stamped and impressed wares that were also widespread. It is not possible within the scope of this paper to discuss all of the details of the distribution and variability of this new ceramic complex. Regardless, it is necessary to understand the broader changes that led to this transformation in pottery and to consider this transition within the larger context of the formation of cultures in southern Egypt and northern Sudan.
Importance of the shift to Black-topped pottery

The technological changes that occurred between the Middle Neolithic and Late Neolithic are important for understanding the advent of Black-topped pottery and its associated assemblage. There is a disjunction between the pottery types and forms of the two periods that reflects more than simply the introduction of a new style. The first major differences are in the basic essentials of pottery production, including the materials and methods used. Both clay and temper raw materials used by Middle Neolithic potters are different from those used during the Late Neolithic. Middle Neolithic vessels are composed of what appear to be clays derived from lake or river deposits and resemble those used for pottery produced during Early Neolithic (Nelson 2001a). The pastes are porous and appear to contain residual silts or gravels, and are tempered with large fragments of granite locally available in the Nabta area. The Late Neolithic wares are made from finer clay, higher in organics than Middle Neolithic clays. The Late Neolithic clay may have been coarser when originally collected from the parent source, and then refined through a process of flotation. The overall appearance of the fabric is similar to that identified in the Badarian by R. F. Friedman (1999, personal communication). Late Neolithic pottery can include sand, sparse carbonized organic material, or both for temper or no temper at all.

In addition to different materials used, very different techniques for finishing and firing were practiced. During the Middle Neolithic, rocker-stamping is still present on some vessels, while others have a roughly smoothed surface. These are the only two surface treatment techniques that have been identified, and they show a transition from the typical rocker-stamped pottery of the Early Neolithic to the roughly smoothed surfaces of the pottery from the last phase of the Middle Neolithic (Nelson 2002c). The finishing techniques for Late Neolithic pottery include new types and a wider variety within those types. Some vessels with blackened lips are smoothed, others are smoothed and burnished and still others are smoothed, slipped and burnished. Slipping and burnishing of vessel surfaces are new techniques added to the pottery-making repertoire. Both added slips and self-slips were noted among the Late Neolithic pottery surface treatments and burnishing, although only on a small number of vessels. They are usually perpendicular to the rim and across much of the vessels’ exterior surfaces.

Slips can serve a variety of functions. They can be applied to add or change the surface colour, to create a fine, smooth surface and/or to reduce the porosity of a vessel (Rice 2005). It is not certain why this technique comes into use at Nabta Playa. Based on the presence of pottery with self-slips, which maintain the same colour as the clay paste, and a few examples with an added red slip in the Late Neolithic assemblage, it appears that the intended outcome was a red surface. This surface colour, however, could have been achieved through the process of creating a self-slip alone. Both processes, slipping and self-slipping, produce a smooth surface, so the reason for an additional slip is not clear.

Changes in firing techniques include possible new methods to achieve higher firing temperatures and the deliberate creation of the black tops. In general, the pottery of the Late Neolithic is fired under higher temperatures than that of either the Early or Middle Neolithic which resulted in greater vitrification of the clay body and so harder, more durable wares. Although it is not certain how higher firing temperatures were achieved, modification in the
types or amounts of fuel or the introduction of basic kilns are possibilities.

Specialised firing to create Black-top ware is first used during the Late Neolithic. Many researchers have discussed the possible methods used to create Black-topped pottery (Davies 1962; Hodges 1982; Lucas and Harris 1962; Spencer 1997), and two detailed studies by S. Hendrickx, Friedman, and F. Loyens (2000) and M. Baba and M. Saito (2004) have examined the processes through a series of experiments and achieved successful results. The findings show that there are several methods that could produce Black-topped vessels; all of them appear to involve a carbon absorption process (smudging) that reflects a detailed knowledge of firing technology and the use of new techniques to create this attribute. Overall, it reflects a more diverse and complicated technological regime.

The forms of Black-topped vessels at Nabta Playa differ greatly from the range of shapes associated with earlier periods. Throughout the Early and Middle Neolithic, the only vessel form documented is the large bowl. The reason for this stability through time is not certain, although based on use-wear analyses, it may be due to the continued use of these vessels for the same or similar purposes (Nelson 2002c). During the Late Neolithic, vessel forms include small, flaring, walled bowls with rounded bases and straight, walled beakers with rounded bases. No tulip-shaped beakers were identified, but the majority of sherds are small and the vessel form could not always be determined. All of the sherds are thin-walled and the fabrics are friable.

The pattern of use for the small, thin-walled, Late Neolithic vessels from Nabta Playa does not suggest that they functioned for storage or cooking based on use-wear and form analysis. H. Howard notes that storage vessels should have restricted orifices, a characteristic absent from the Late Neolithic pottery assemblage, and there are no visible residues or soot deposits to suggest that they were used for cooking (1981). Given that the vessels are strong, thin-walled, lightweight and small, in general they can be characterised as having the same form as elongated gourd vessels. They may have been used for collecting, processing and serving milk and blood. Gourds are used for these functions in ethnographically documented pastoral cases, including several examples by the Maasai (Ibrahim 2001; Merker 1910; Spencer 1988; Talbot 1964), but given the long history of use of pottery in the region, ceramic vessels may have taken on this role.

Discussion and conclusion

What is the significance of the disjunction between the Middle Neolithic and Late Neolithic assemblages at Nabta Playa and the emergence of Black-topped pottery? The transformation in pottery production reflects important shifts in technology and changes in pottery use that are part of a larger system of changes in the social organisation, visible in the construction of monuments (megaliths) and the understanding of time (calendar circle and megalithic alignments).

Technological choices are bounded by the limits of resource access and technological knowledge. They are also restricted and driven by culture (Van der Leew 1993). It is within these confines of access (Arnold 1988) and learned behaviour (see Graves 1981) that technological and stylistic changes occur. Thus, the multitude of changes that appears in
pottery during the Late Neolithic are an important reflection of broader changes that occur during this period.

As the process of desertification slowly took hold, mobility patterns of groups using the desert lakes would have become more restricted and mobile peoples would have had to rely on permanent water sources for at least part of the year. The problems of available water, plants and animals for human consumption would have been heightened during the arid interphase that occurred at the end of the Middle Neolithic. This would have resulted in people clustering around the major water sources.

These climatic changes and the resulting limitations in water sources would have altered traditional mobility patterns. In doing so, they may have forced or encouraged greater interaction among groups and resulted in greater one-on-one interaction among potters of different cultures. In essence, they may have changed the spheres of interaction, leading to cultural transmission. Finally, the climatic changes may have forced the formation of new groups in which technological change was an outgrowth of a melding of cultures. When new cultures are formed, new pottery styles can be either an amalgam of previous styles or a formation of totally new types that reflect the needs of the newly formed system. This has been documented in other regions that faced similar conditions, such as the American Southwest, where, following the onset of a severe drought, pottery styles changed in areas where populations clustered (Duff 2002; Cameron 1995; Cordell 1995). Based on the technological and material changes at Nabta Playa, the first appearance of Black-topped pottery occurred during a period of increased aridity which caused shifts in mobility and interaction. These factors spurred technological innovation, encouraged the development of new styles and influenced the rise of complexity during the Late Neolithic.

Acknowledgements

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Cover image: Gebel Nabta (author's photograph).

Bibliography


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NABTA PLAYA POTTERY


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Table 1: Nabta Playa sites with Late/Final Neolithic pottery (adapted from Schild and Wendorf 2001: table 3.1; Nelson 2002a).
Fig. 1: Map of the location of Nabta Playa.
Fig. 2: Map of archaeological sites at Nabta Playa. The sites mentioned in the text are in large font. Not included are Sites E-77-1 and E-94-3, which are located closer to Gebel Nabta. Map created by R. Schild, M. Puszkarski and A. Mazhar as part of CPE activities in years 2001–2007.
Fig. 3: Detail of Site E-75-8. Map created by R. Schild, M. Puszkarski and A. Mazhar as part of CPE activities in years 2001–2007.
Fig. 4: Examples of Black-topped pottery from Site E-75-8, Nabta Playa.