

PERFORMANCE AND PARTICIPATION: MULTI-SENSUAL ANALYSIS OF NEAR EASTERN PRE-POTTERY NEOLITHIC NON-DOMESTIC ARCHITECTURE

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Abstract: *A series of non-domestic structures have been found at Pre-Pottery Neolithic (PPN) sites across the Near East, but have not been comprehensively analysed to determine how they were used and perceived by inhabitants of the site. A multi-sensual embodied analysis of the non-domestic structures at Göbekli Tepe, Nevalı Çori, and Jerf el-Ahmar show that these structures were very open and undifferentiated, and would have facilitated sharing of highly charged experiences rather than fostering and materializing hierarchical relationships. Analysis of the physical reality of inhabiting these spaces permits a contextual and nuanced model of the capacity of the structures to be constructed, elucidating the types of relationships that would be created and maintained within these spaces.*

Résumé: *Plusieurs constructions de nature non-domestique appartenant au Néolithique Précéramique ont été fouillées dans tout le Proche-Orient, mais leur mode de fonctionnement et de perception de la part de leurs habitants n'a pas été analysé de manière approfondie. Une analyse « pluri-sensuelle » des constructions non domestiques de Göbekli Tepe, Nevalı Çori et Jerf el Ahmar montrent qu'elle étaient, par nature, ouvertes et indifférenciées. Elles devaient faciliter le partage d'expériences fortes, plutôt que favoriser l'établissement de relations hiérarchiques. L'analyse concrète de ces espaces habités permet l'élaboration d'un modèle contextuel et nuancé sur leurs capacités, tout en éclairant les types de relations qui s'y établissaient.*

Keywords: *Pre-Pottery Neolithic; Non-domestic; Communal; Embodiment; Capacity.*

Mots-clés: *Néolithique Pré-Céramique; Non domestique; Communautaire; Personnification; Capacité.*

INTRODUCTION

Pre-Pottery Neolithic research in the Near East has been increasingly focussed on questions about the relationship between and within communities. As more research reveals the complex practices related to subsistence, production, construction, mortuary practices, and exchange, archaeologists have investigated the way these reflect the development and maintenance of relationships (Croucher 2005a; Hodder 2010 (ed.); Watkins 2008 and 2010). Some archaeologists have suggested that the development of sedentary communities would have resulted in tension and interpersonal stress from these new lifestyles, requiring communities to develop mechanisms to maintain relationships and community cohesion (Bandy

2004; Gebel 2005: 28; Rollefson 2005: 9; Verhoeven 2002a: 247 and 2002b: 9; Verhoeven 2005: 41; Watkins 2008 and 2010). One potential source of evidence for new types of relationships in the PPN is a series of non-domestic structures found at many Near Eastern sites (Kornienko 2009; Schmidt and Hauptmann 2003; Verhoeven 2002a). Previous studies of these structures have generally focussed on a single site and interpreted them as ritual buildings, or temples; however, there has been little contextual analysis of how the structures were used and perceived, and there is little agreement about how to approach and interpret these structures. Here, I present an embodied, multi-sensual reproducible methodology to analyse these structures and facilitate a contextual comparison between the spaces.

Traditional methods of analysing architecture examine overhead plans, ignoring the way that people would actually have experienced the space and imposing a modern western bias. In response, phenomenological methodologies have incorporated embodied experience since the human body mediates perception (Ingold 2000: 262-264; Merleau-Ponty 1962). Multi-sensual analyses have particularly been applied to studies of landscape and British megalithic structures to varying degrees (Bender *et al.* 2007; Brück 2005; Cummings *et al.* 2002; Hamilton and Whitehouse 2006; Thomas 1990 and 1993; Tilley 2004; Watson and Keating 1999). Sight has been the main focus of these studies, looking at intervisibility between and within sites, as well as exploring colour and light (Bradley 1989; Cummings *et al.* 2002; Lynch 1998). GIS has also been used to reconstruct the viewsheds of sites, examining what was visible from a location using the topography of the landscape (Chapman and Gearey 2000; Fitzjohn 2007; Llobera 2001; Wheatley and Gillings 2000). Sound is becoming an important part of the exploration of the perception of ancient monuments (Devereux and Jahn 1996; Jahn *et al.* 1996), measuring the acoustic properties of enclosed sites. For example, Watson and Keating (1999) determined that the experience would have been different between participants inside and outside a passage tomb. Other sensual studies, such as texture and colour, have been undertaken (Cummings 2002; Hosler 1995; Lynch 1998).

These previous phenomenological approaches have focussed on past landscapes, prioritizing sight in their analyses (Cummings, Jones and Watson 2002; Lake and Woodman 2003; Lynch 1998; Tilley 2004). Ethnographic literature has demonstrated though that other cultures perceive senses in a variety of ways, and the single focus on sight does not necessarily provide useful insight into past experience (Classen *et al.* 1994; Howes 1991; Pocock 1988 and 1989; Porteous 1985; Rodaway 1994: 22-24; Stoller 1989). Some researchers are addressing this criticism, with new studies incorporating multiple senses emerging (Hamilton and Whitehouse 2006; Hemsley 2008; Skeates 2010); however, the main emphasis still tends to be a single sense. Additionally, previous studies have prioritised the experience of a single observer, despite the fact that the PPN non-domestic spaces would likely have been occupied by groups of people. While phenomenological methodologies have been criticised by some as being rather unscientific and ‘touchy-feely’, as they often focus on describing the affective response of a modern observer moving through the landscape (Fleming 2006: 273; Hamilton and Whitehouse 2006: 32), this does not invalidate the importance of understanding the physical rather than emotional experience of space.

The methodology developed here applies some of the techniques used in previous studies, such as viewsheds, while modifying others, such as acoustics, as they were difficult to apply to fragmentary prehistoric architecture. Other senses, such as taste and colour have not been examined in detail due to the lack of relevant information, though this could change with further excavation. This methodology examines the multi-sensual experience of the PPN non-domestic architecture, while also taking into account the fact that groups of people would have been present together. This is then applied to three case study sites, Göbekli Tepe, Nevalı Çori, and Jerf el-Ahmar, to explore the development of non-domestic architecture in the PPN (fig. 1). While there are many sites with non-domestic architecture, such as Çayönü, Beidha, Aşıklı Höyük, and ‘Ain Ghazal, these sites were chosen as they are well published and are representative examples of the types of non-domestic spaces found in the PPN, with similar features and capacities (Kornienko 2009; McBride 2012). While the selection of case studies rather than a comprehensive analysis does remove some of the variability present in the archaeological record, this permits a demonstration of how a sensual reconstruction can be applied and interpreted without being overwhelmed with multiple sites. The reconstruction of the physical experience of the non-domestic structures at these sites will therefore provide valuable insight into the way people perceived and experienced the spaces, which in turn elucidates the way they functioned in PPN settlements. It will also clarify how these people were creating and maintaining relationships and community cohesion.

GÖBEKLI TEPE

Göbekli Tepe is located 15 km Northeast of Urfa in South-eastern Turkey and has been dated to the PPNA period, with younger levels dated to the EPPNB (Schmidt 2010: 240). The site has a series of monumental oval structures that have been interpreted as non-domestic and were lined with megalithic T-shaped pillars with two larger T-shaped pillars in the centre of the structure (see fig. 2) (Schmidt 2003: 3; 2004: 98 and 2010). A large proportion of these pillars was decorated with images and have arms, suggesting that the pillars themselves were anthropomorphic. The perimeter pillars were approximately 3 m tall, while the central pillars were almost 5 m tall. These pillars could have been support for the roof, as well as focus for attention, and appear to have been set into bedrock pedestals (Schmidt 2010: 243). Another similar enclosure, F,

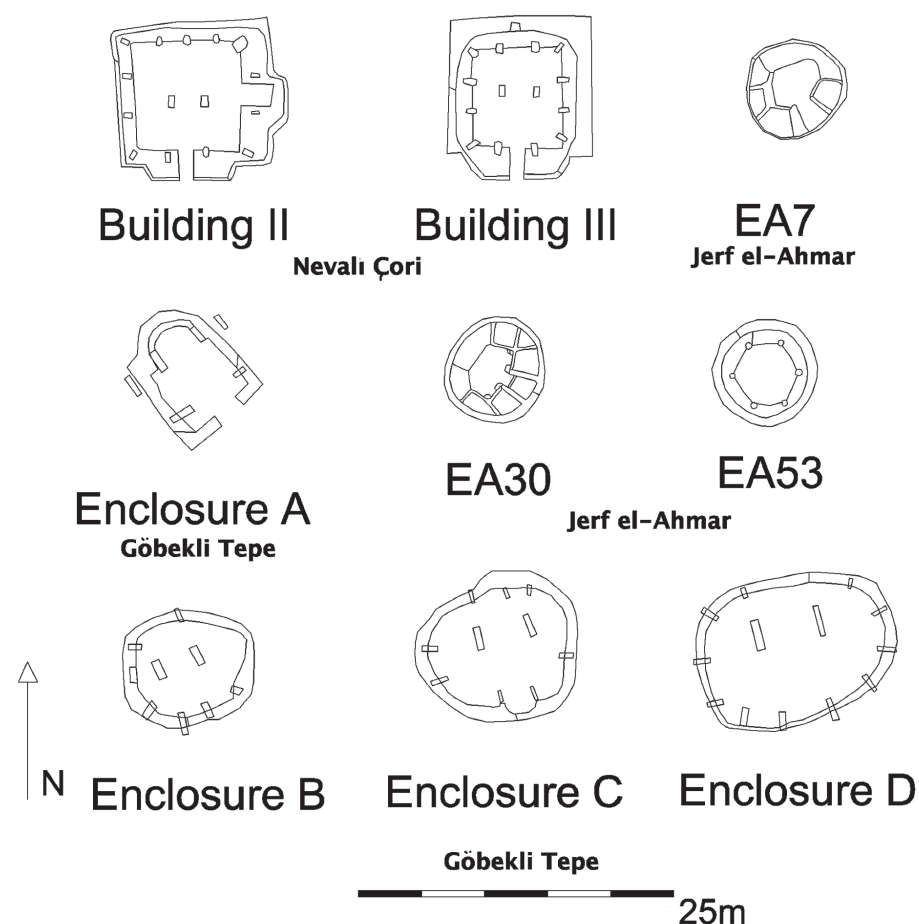


Fig. 1 – Case study structures from Nevalı Çori (II and III), Jerf el-Ahmar (EA7, EA30, and EA53), and Göbekli Tepe (Enclosures A, B, C, and D).

has been excavated at the site, but as it has not been well published, it is not discussed in much detail here (Schmidt 2010).

There is evidence for benches around the perimeter of the enclosures. In Enclosure A, there was a bench built into the alcove between pillars 1 and 2, while recent excavation has also shown benches around the perimeter of Enclosure C (Schmidt 2010: 251). This suggests that benches might have lined the perimeter of the other enclosures as well. In this analysis, benches have been modelled around the perimeter of the structures based on this evidence, as well as comparisons with Nevalı Çori and Jerf el-Ahmar.

There was other evidence for the rebuilding of structures, with some of the decoration on the T-shaped pillars covered by wall construction, discussed in more detail later. There were also wall fragments around the excavated enclosures that have been interpreted as double walls by the excavators, as can be

seen in Figure 2, but it seems more likely that these walls were earlier structures that were disturbed by later constructions. Unfortunately, the stratigraphy of these structures is complicated and, as excavation is on-going, the relationship between the various structures and wall fragments is not fully published. The focus of this study is on the interior of the structures, so until more detailed information is available the interpretation of these exterior wall fragments can remain uncertain.

While the excavators have suggested that these enclosures were unroofed (Schmidt 1999: 13 and 2001: 51), there is little to suggest that the interiors were exposed to the elements, especially as the excavators have described how fragile the mortar used between the stones is, and how rainwater quickly washes it away (Schmidt 2010: 241). However, it has also been suggested that the structures might have been constructed, used, and then abandoned and filled in quick succession, which would negate

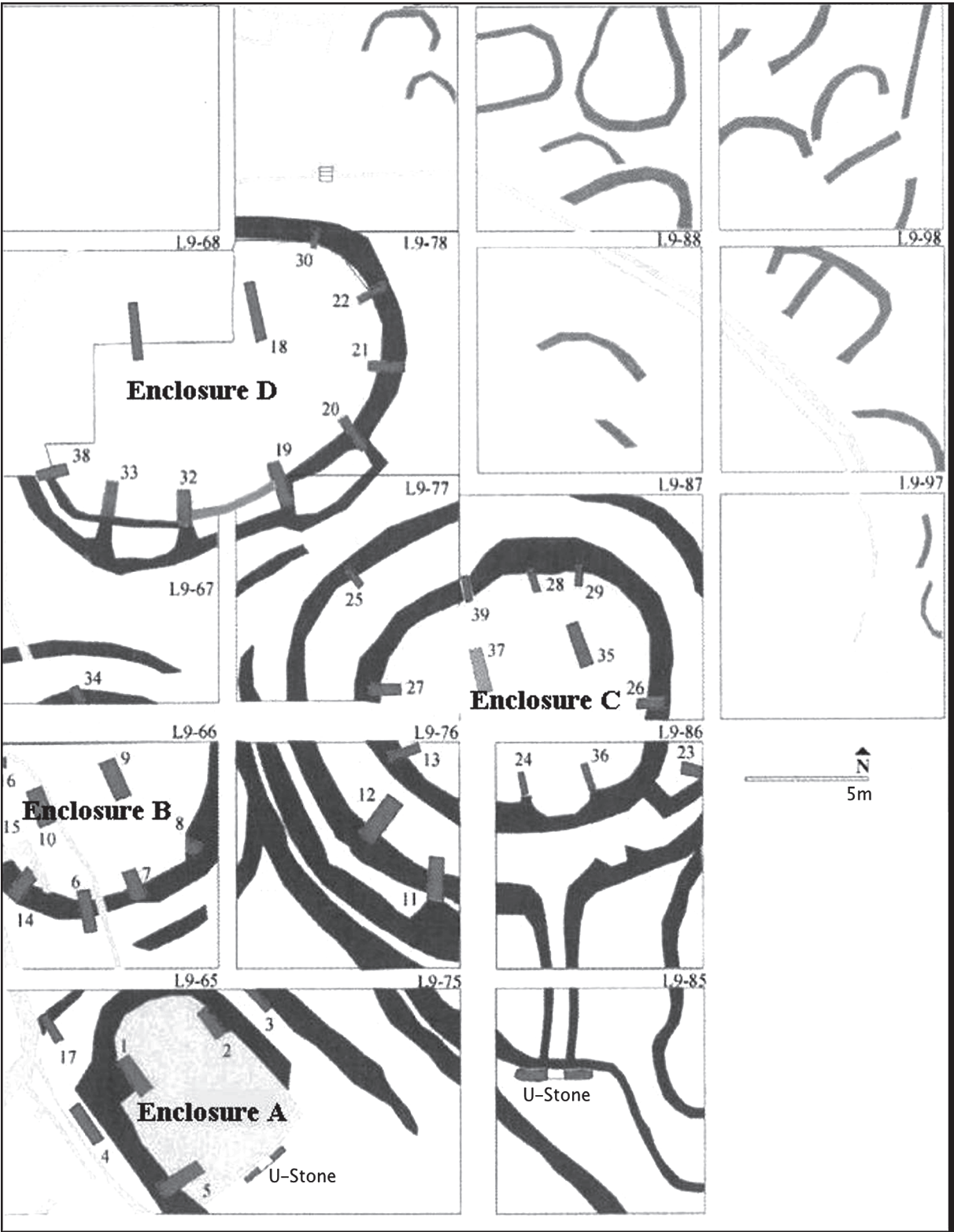


Fig. 2 – Plan of non-domestic enclosures at Göbekli Tepe (after Schmidt 2007: 199).

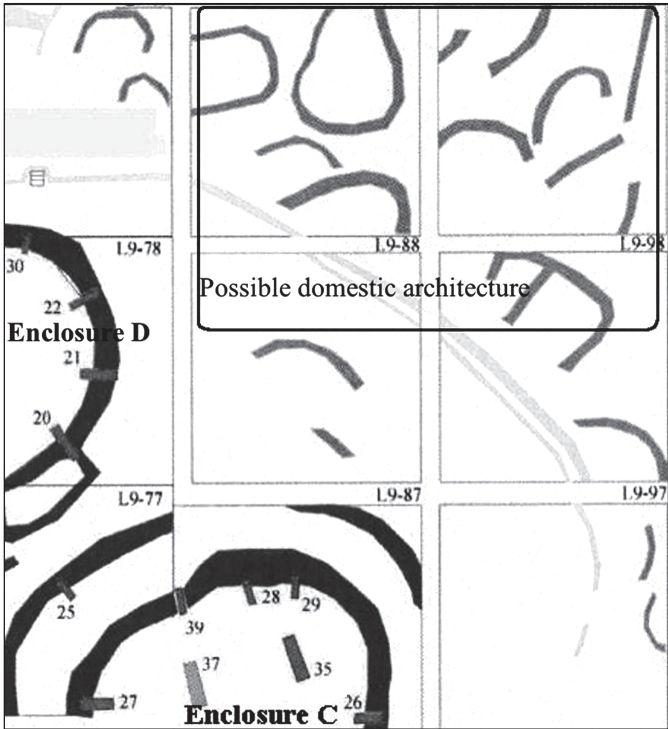


Fig. 3 – Plan of Göbekli Tepe showing the location of potential PPNA architecture (after Schmidt 2007: 199).

the effect of exposure to the elements (Schmidt 2001: 46). As there is not yet any excavated evidence for roofing, it is difficult to determine with certainty how the structures were roofed. However, as there is some imagery that suggests that the roofs of these non-domestic structures might have been domed or had rounded openings and taller central pillars, as well as evidence for preparation on the tops of the pillars (Banning 2011: 629-631), the reconstructions below have assumed that the enclosures were roofed.

There is little evidence for entrances to these structures. The excavators have suggested that enclosure C was entered from the south, along a causeway marked by a monumental U-stone (Schmidt 2007: 156). There is a thinning of the wall of enclosure C at this point, but no clear entrance has been found at any of the enclosures. I feel that there is not enough evidence for the stratigraphy of the various wall fragments surrounding the enclosures to adequately address the question, and as I am focusing on the interior of the enclosures, the argument for a causeway is not critical. I have modelled the entrance to enclosure C through the thinned area to the south, as this is the only hint of an entrance, though it is possible that the entrance was elsewhere. Similarly, I have modelled the entrance of enclosure D to

the north of the enclosure, as there are fewer impediments from surrounding architecture (see fig. 2). Surrounding architecture is also the reason that the entrance to enclosure B has been modelled to the north and the entrance to enclosure A to the south-east. Obviously, there is very little evidence for access to these structures; however, as the enclosures are generally open and symmetrical, the exact entrance location will not affect the conclusions of the model greatly, and when further evidence for the entrances is available, the model can be updated.

The excavators believe that there was no permanent occupation at Göbekli Tepe during the PPNA (Schmidt 2005), meaning that builders came to the site for relatively short periods of time, though recently they have conceded that some people might have lived on the site, such as specialists and builders (Schmidt 2004: 14; 2005: 103 and 2010: 240). In response to this, Banning (2011) has suggested that these large enclosures should be considered domestic dwellings. However, as structures that resemble PPNA/EPPNB domestic architecture have been found, as shown in Figure 3, the more likely interpretation is that there was a contemporary settlement at the site. As this study focuses on the interior of the non-domestic structures, the debate over the existence of a contemporary settlement does not need to be resolved.

JERF EL-AHMAR

Jerf el-Ahmar is located in Syria 100 km east of Aleppo, just south of the Turkish border and was flooded in 1999 (Stordeur 1999: 132). The site was located on the Euphrates, and was made up of two small knolls. The eastern knoll was occupied first with nine subsequent layers of occupation, while the western knoll was occupied slightly later with six occupation layers (Stordeur 2000: 1; Stordeur et Abbès 2002: 567-568). A series of at least four non-domestic structures was found at the site that differed substantially from the contemporary domestic architecture (table 1).

Table 1 – Chronology of occupation at Jerf el-Ahmar with non-domestic structures (after Stordeur et Abbès 2002: 568).

East	West
-1/E (EA53)	1/W (EA100)
0/E	II/W (EA30)
1/E (EA7)	III/W (EA30)
II/E (EA7)	Sounding
III/E (Aurochs house)	

The excavators of Jerf el-Ahmar have identified five potential non-domestic structures: the Aurochs house, EA7, EA30, EA53, and EA100. These structures were so identified as they differ radically from the typical structure found at the site. The Aurochs house is the earliest identified on level III/E, characterised by a round single-celled space (Stordeur et Abbès 2002: 568), but as there is no published plan of level III/E from Jerf el-Ahmar, the Aurochs house has not been studied in great detail.

Following the destruction of level III/E and the Aurochs house, multi-celled non-domestic architecture was built on both the eastern and western mound: EA7 in the east and EA30 in the west. EA7 appears to have been built earlier, but it is possible that EA30 was contemporary. Both EA7 and EA30 were subterranean and circular, unlike the contemporary domestic architecture, which was built above ground and was sub-rectangular (Stordeur et Abbès 2002: 568; Stordeur *et al.* 2000: 31-32). The buildings would have been accessed through the centre of the roof and the ladder would have been a central feature of the structures, though the only evidence for them is a small depression in the centre of the floor of the later EA53 (Stordeur *et al.* 2001: 35, 40).

EA30 was subdivided into small cells arranged around the eastern perimeter. There was a low step in the northeast and southeast corner of the central space suggesting that the five perimeter cells had low walls to permit access (Stordeur *et al.* 2000: 35). The central cell had no step and was lined by the full-height support walls; however, in the front wall of the cell there was a small rectangular opening close to the floor perhaps to insert items. Opposite the cells on the western edge of the structure were two bench sections, while the central area of the structure was open to accommodate the ladder.

EA7 was not as well preserved as EA30, and has therefore received less attention, but a similar group of features was found. There were at least three small cells lining the southern wall, and a bench ran along the perimeter of the northern wall (Stordeur 1999: 141). It is unclear how high the dividing walls for the small cells were. Comparisons with EA30 suggests that the perimeter cell walls were low, though it is unclear whether two of the walls would have been full height in order to support the roof. As no evidence has been found for other roof supports, it is likely that there were full height walls and have been modelled as such below. No artefacts were found in EA7, but two skulls had been placed at the bottom of a posthole (Stordeur 1999: 141-142; 2000: 1; Stordeur et Abbès 2002: 568).

After the abandonment of EA7 and EA30, single-celled non-domestic structures EA53 and EA100 were constructed.

EA53 was best preserved, and consisted of a single round subterranean structure, 7 m in diameter. EA53 was very different from the earlier structures, as it was not subdivided into small cells. The space was lined with a 1 m wide stone bench, creating a hexagon around the perimeter of the building (Stordeur *et al.* 2000: 38). At each angle of the hexagon there was a plaster lined wooden post to support the roof instead of the supporting walls found in EA30. The front of the bench was lined with stone slabs decorated with a hanging triangle motif (Stordeur 2000: 3; Stordeur et Abbès 2002: 572-573; Stordeur *et al.* 2000: 38-40); the bench also had wear impressions on the top, indicating where people sat, as well as some graffiti.

EA100 was very poorly preserved and is not studied in detail here. The building appears to have been very similar to EA53 though, with a hexagonal bench around the perimeter and wooden support posts. There was also vulture figures set in to the front of the bench (Stordeur 1999: 572; Stordeur *et al.* 2000: 40).

The non-domestic structures EA7, EA30, EA53, and EA100 were all significantly different from the contemporary domestic structures. EA7 and EA30 were subterranean, circular, and had small chambers and bench segments. By comparison, the contemporary domestic architecture was above ground and sub-rectangular. EA53 and EA100 were also subterranean, circular, and lined with a bench, while the contemporary domestic structures were above ground and rectangular. These mark the non-domestic structures as having a different intended purpose to the more common architecture at the site.

NEVALI ÇORI

Nevalı Çori is located in the Kantara Valley in Urfa province of Turkey, about 3 km south of the Euphrates (Hauptmann 1999: 70; Mellink 1990: 127). A total of 29 houses, plus two larger non-domestic structures, were excavated.

Cult building II was the earliest excavated non-domestic structure at Nevalı Çori. The structure was almost square and was lined with a bench made of large stone slabs. A large niche was located in the eastern wall, and there were monumental pillars around the perimeter as possible roof supports. There also appear to have been two central pillars standing in the middle of the structure. Though only scars of these central pillars were found in building II, building III had similar pillars extant (Hauptmann 1999: 75).

Building II was replaced by cult building III, which was constructed inside the walls of building II. It was slightly

smaller and was also lined with a stone slab bench and standing stones around the perimeter. Remains of two standing stones were found set in the centre of the structure, matching the scars found in the earlier cult building II. These standing stones had depictions of bent arms on the long sides and fingers and hands on the narrow edge, prompting the suggestion that they were anthropomorphic. Finally, a niche was built into the back wall of building III, carefully placed to as to be visible between the two central pillars.

These two structures have been interpreted as ritual cult buildings due to the monumental sculpture that has been found in them, including the large pillars, as well as some smaller sculptures that seem to have been reused in the construction of the buildings, perhaps retaining their power within the space. Several pieces of sculpture were buried in the bench of the back wall of cult building II, believed to have been from a predecessor. A broken limestone head with snake representing hair on the back was found built into the back of the niche of building III, and several other pieces of sculpture were found, including several composite figures with both bird-like and human features (Hauptmann 1999: 75-76).

Both buildings had a series of standing stones around the perimeter, as well as two further standing stones in the centre of the structure (Hauptmann 1999: 74-75). These pillars were likely T-shaped and are believed to be anthropomorphic due to the existence of bent arms and hands carved in low relief on them. While these pillars might simply have been for roof support, the careful preparation and decoration indicates that they were important for the activities taking place in the buildings. In fact, it is possible that the central pillars from cult building II were retrieved and reused in cult building III, as only scars were found in building II.

These three case study sites have evidence for structures that were significantly different from contemporary domestic architecture. In general, the structures were larger than the common architecture at the site, while also having features that marked them as distinctive, such as benches and monumental standing stones. This means that the builders deliberately chose different layouts and features, and indicates that they were perceived differently from domestic architecture. The non-domestic structures at Jerf el-Ahmar were significantly different from the contemporary domestic architecture. They were mostly subterranean and circular. At Nevalı Çori, the structures were also an unusual shape and size when compared to the contemporary architecture, with benches and standing stones to mark them as significant. The Göbekli Tepe structures had similar features, so regardless of whether there was a contemporary settlement, the evidence suggests that the struc-

tures at all three sites were constructed deliberately to provide different affordances than the more common architecture.

These structures need to be analysed in a situated, embodied way, taking into account the site-specific context of the spaces, as well as the details of structures rather than simply comparing floor plans. The methodology below employs a number of different analyses exploring the internal affordances of the various structures. This clarifies how the spaces structured interactions, as well as how participants would have perceived events. The analyses will also determine what types of activities are most likely to have taken place within these spaces. While it is obviously possible that these structures were used for a variety of different activities, including dwelling and daily household activities, they were constructed with distinctive affordances indicating the builders and users perceived them differently from other architecture.

MULTI-SENSUAL ANALYSIS

The analysis employed here was developed in order to provide a reproducible methodology to reconstruct the physical reality of inhabiting the non-domestic architecture, drawing inspiration from both traditional and phenomenological approaches to architecture (McBride 2012). This methodology focuses on the physical multi-sensual experience of participating in events in these structures, rather than examining a two-dimensional plan. Other multi-sensual physical reconstructions are employed in the European Neolithic (Boivin *et al.* 2007; Hamilton and Whitehouse 2006; Skeates 2010), but they are only beginning to be explored in the Near Eastern Neolithic, where the physical reality of domestic architecture, mortuary practices, and agricultural practices have been discussed (Croucher 2005a and b; Fuller *et al.* 2010; Hemsley 2008). This methodology therefore develops a multi-sensual methodology that can be applied in other situations to determine how spaces were used and perceived. The details of each analysis, as well as the results, are discussed below.

Artefacts are one common way that archaeologists reconstruct the way prehistoric architecture was used. The interior of the non-domestic structures were generally very clean though, which means that there are few indications from artefacts as to the use and function of the spaces. However, there were features that suggest activities taking place. Benches were present at all three case study sites. At Nevalı Çori and Jerf el-Ahmar, there is evidence that benches lined the perimeter of the structures, though the earlier EA7 and EA30 at Jerf el-Ahmar only

had bench segments (Hauptmann 1999; Stordeur et Abbès 2002). There is also evidence of benches lining the perimeter of one of the structures at Göbekli Tepe, which might indicate that this was a common feature of the monumental enclosures there (Schmidt 2010: 251, Fig. 22). These benches were likely used for seating based on their height and evidence for wear from Jerf el-Ahmar (Stordeur *et al.* 2000: 40), and the arrangement of participants around the perimeter suggests that there was a central focus for the activities taking place. This does not preclude the possibility that people were sitting or standing elsewhere in the structure, but the construction of benches indicates that the seating of participants around the perimeter was an important aspect of activities taking place in the structures, as effort was made to construct the benches.

Uprights and standing stones were also found at all three case study sites. At Göbekli Tepe and Nevalı Çori, there were monumental T-shaped stone pillars arranged around the perimeter with two more in the centre. At Jerf el-Ahmar, the later EA53 had wooden upright posts at the intersection of each bench segment, and these uprights would have structured the way participants could have interacted while also likely having symbolic significance. The T-shaped standing stones seem to represent human forms, many of them even having indications of arms and clothing to reinforce this interpretation (Hauptmann 1999). T-shaped pillars were common at Neolithic sites in Southeast Anatolia, indicating that the stylized representation of the human form had widespread significance (Schmidt 2005: 15). These figures have been interpreted in a number of different ways, including deities, ancestors, spirits, and guardians (Schmidt 2005: 14 and 2010), and while these are of course possible explanations, I think that the repetition of the figures around the perimeter of the structure could indicate that these images also represent participants, and might give us an indication of body posture and clothing of the human participants.

At Göbekli Tepe, there were many decorations on the T-shaped pillars. These images have received a great deal of attention by researchers attempting to reconstruct PPN cosmology and social organisation (Bischoff 2002; Cauvin 2000; Hodder 2010; Hodder and Meskell 2010; Schmandt-Besserat 2005; Schmidt 1998; 1999 and 2004). In all cases though, the context of these images is not taken into account. These images are on the whole quite small and dispersed throughout the structures, meaning that there is no single location within the enclosures where all of the images would have been visible. This means that participants would have had to move through the enclosure in order to experience all of the images, or could indicate that viewing the images was not an important aspect

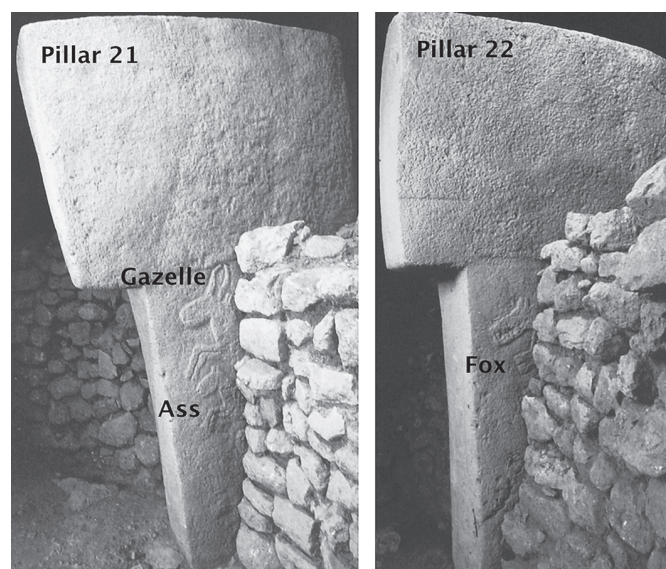


Fig. 4 – Pillars 21 and 22, Göbekli Tepe showing covered imagery (after Schmidt 2007: 176-177)

of their purpose for participants. In some cases, images have even been obscured by the construction of the walls of the enclosures (fig. 4). While in some cases, this obstruction might be the result of the infilling of the enclosures upon abandonment or simply later reconstruction, the two examples shown in Figure 4 clearly have wall constructed over the images of animals. This suggests that the creation and existence of the images was most important factor of these images rather than their visual impact. This puts a very different emphasis on these images than studies that explore content while ignoring context.

The earlier structures at Jerf el-Ahmar, EA7 and EA30, both had small chambers around one side of the perimeter interpreted as storage spaces. Tools and faunal remains are the main artefacts found in the cells of EA30, though it is unclear which cells held what remains. The excavators claim that the artefacts found in EA30 were particularly large and well-made, including materials such as obsidian and ochre which are imported and believed to be prestigious (Stordeur *et al.* 2000: 36). However, without a more detailed description of the materials found elsewhere on the site, it is difficult to interpret these pieces. Additionally, this evidence does not demonstrate that the cells were necessarily used for storage. While there has been recent discussion of the development of communal storage during the PPN (Finlayson *et al.* 2011; Kuijt 2009; Kuijt and Finlayson 2009), the presence of small chambers in a communal structure does not mean they were used as commu-

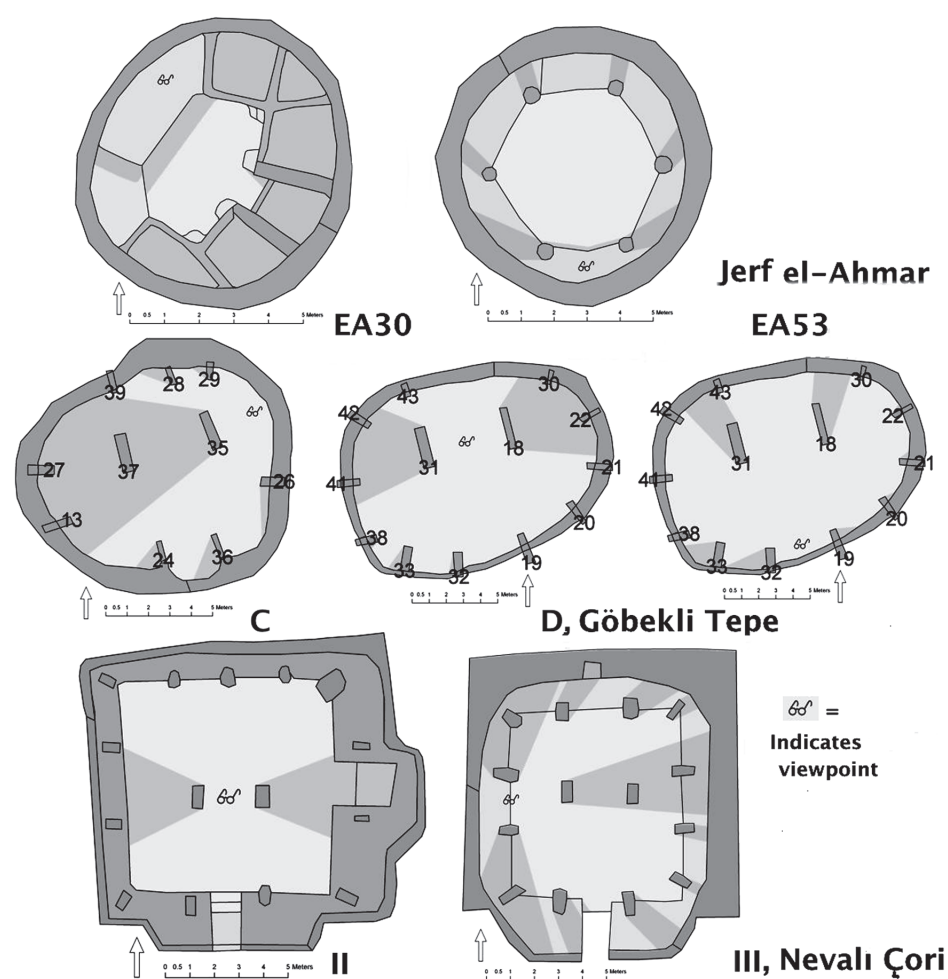


Fig. 5 – Viewsheds within the non-domestic structures, enclosures C and D at Göbekli Tepe are shown as representative examples.

nal granaries. Instead, the small spaces could have been used to contain activities, or to store materials specifically related to the events taking place in the structures.

Both buildings at Nevalı Çori had niches, but they seem to have been used in different ways. Building II had a large section of the eastern wall set back, forming a niche. There appears to have been a platform built in it, perhaps to display objects (Hauptmann 1999: 74). In building III, the niche is set in the northern wall of the structure, making it less accessible than the one in building II. Set into the back of the niche in building II was the sculpture of a head with a snake on the back (Hauptmann 1999: 75). The location of the building II niche above the bench at the rear of the structure would have meant that any item displayed there would have been out of reach during events, and so was likely intended for display. The larger

niche in building III was not isolated from activities, and it seems likely that participants would have been interacting with anything displayed there.

Visibility within the structures was open and undifferentiated (see fig. 5). Despite the large upright central stone pillars at Göbekli Tepe and Nevalı Çori, there was little impediment to sight. GIS viewshed analysis within the structures shows that participants could have generally seen the entirety of the interior, though small segments of the perimeter would have been blocked from viewing the centre. At Nevalı Çori building II, the central pillars would also have blocked the view of the niche on the eastern side, which might indicate that there was some restriction on the activities taking place in this niche, but the niche would have been visible from the majority of the structure, with only a small proportion blocked by the central pillars. This

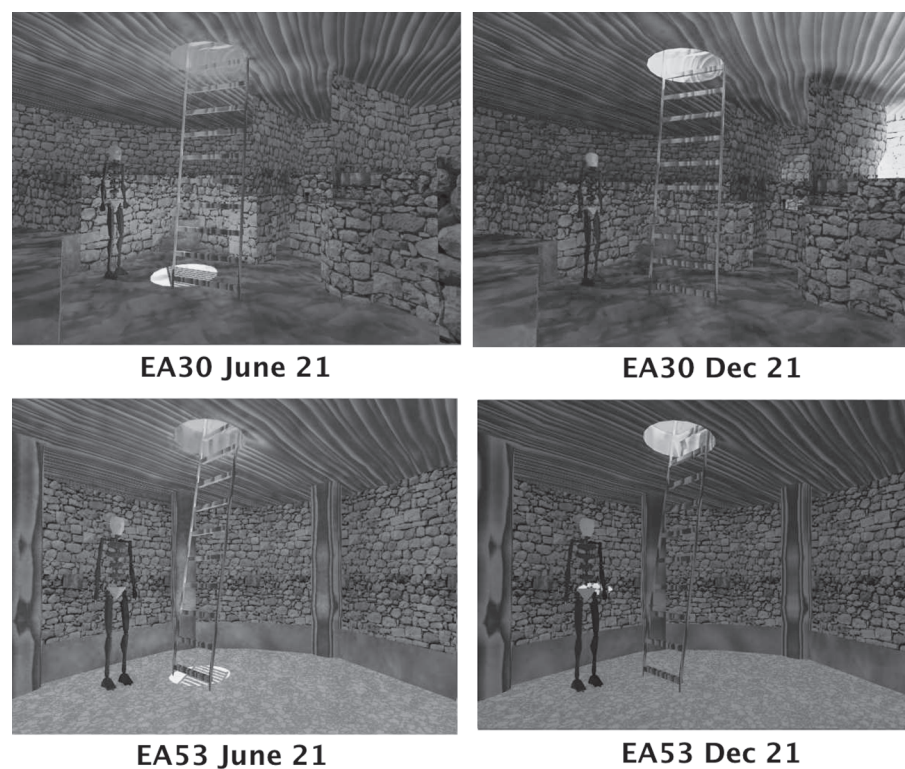


Fig. 6 – *Lighting reconstructions at Jerf el-Ahmar, noon.*

means that all participants in the structures would have had an open and undifferentiated visual experience of events.

The way that the structures were lit would also have altered the participant experience within them. It is of course possible that the structures originally had windows, skylights, or light wells, or that participants brought lanterns or torches with them, but currently there is no direct evidence for these sources of light in these structures. As the exact location of these potential windows or lightwells drastically alters the way light would have entered the structures, the simplest model has been undertaken here, and further evidence can be incorporated as it becomes available. This means that the structures were modelled as if they were lit through the doorways with sunlight using the reconstruction software 3D StudioMax. At Jerf el-Ahmar, entrance took place through the roof, so there was no possible direct astrological alignment, and while the sun would have lit the structure differentially over the course of the day, there was little variation over the course of the year (fig. 6). At Göbekli Tepe the location of the entrances is still debated. I have modelled the entrance of enclosure C in the south due to the location of the U-stone and the suggestion of the excavator (Schmidt 2005: 17), though of course this might

change with further excavation. The south-facing entrances at Nevalı Çori and Göbekli Tepe enclosure C would have taken advantage of the low angle of the winter sun, but would have shown little variation over the course of the year (see fig. 7 and 8). As was discussed earlier, there has been some suggestion that the Göbekli Tepe structures might have been unroofed (Schmidt 1999: 13; Schmidt 2001: 51), but close examination of the tops of the pillars gives indications of potential preparation for roofing, while the interiors show little evidence for being exposed to the elements (Banning 2011: 629-631; Schmidt 2010: 241). While some might argue that this instead points to quick infilling of the structures, it seems more likely that the structures were indeed roofed, though a central hole might have existed (see fig. 8). Once again, this reconstruction must remain speculative until further evidence is available.

On the whole, the non-domestic structures would have been generally quite dark if they were only lit by sunlight through the doorways, which suggests either that participants would have brought illumination with them in the form of torches or lanterns, or conversely, that events taking place within the structures were intended to be carried out in low light, perhaps to enhance any performance effects.

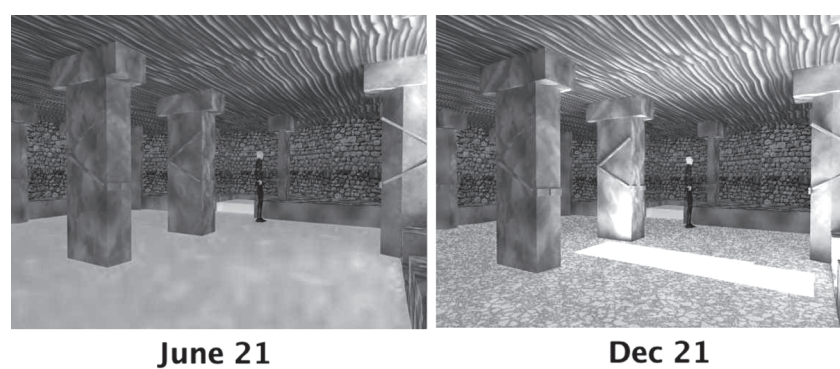


Fig. 7 – *Lighting reconstruction in building II, Nevalı Çori, noon.*

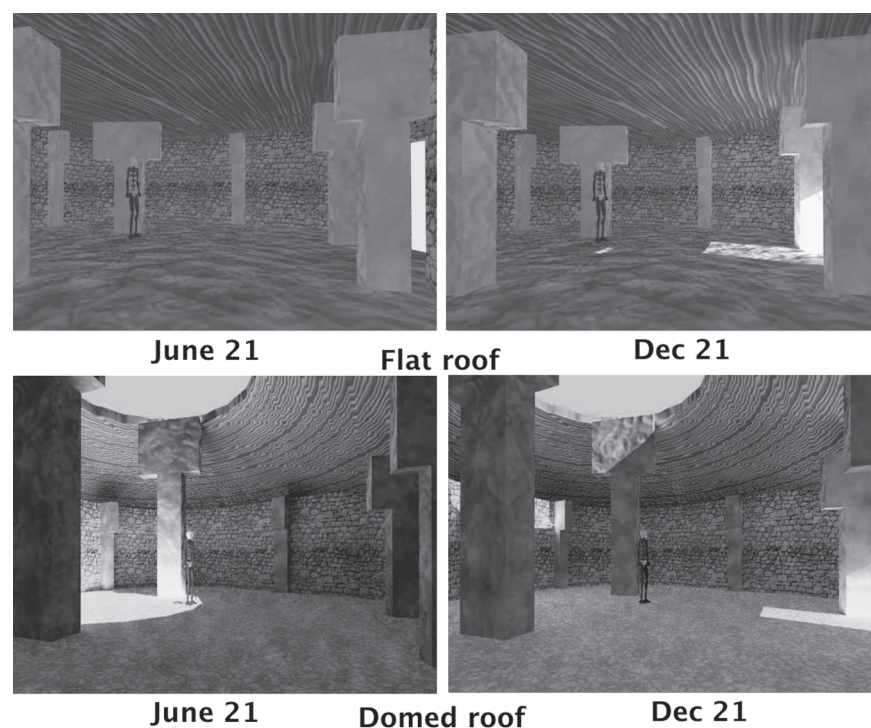


Fig. 8 – *Lighting reconstruction in enclosure C, Göbekli Tepe, noon.*

The acoustics of the structures would have had an important impact on the experience of events within them. Many archaeoacoustical studies have analysed structures by physically measuring the acoustics of the spaces. However, this technique is not applicable in these cases, as the spaces are not fully preserved. Additionally, mathematical models of the behaviour of sound cannot be applied to the case study structures as small adjustments in internal geometry have a

big impact on the results. These difficulties applying acoustic methodologies means that only the reverberation time of the spaces can be calculated, as this analysis is based purely on air volume and surface area of various materials, rather than the exact geometry of the structure (see fig. 9). Reverberation time refers to the length of time it takes for echoes to fade away and is particularly important for the intelligibility of speech, with ideal times between 0.4 and 1.0 sec. When the reverberation

Reverberation time = 0.16 × Volume of the room ×
Fig. 9 – Formula for the calculation of reverberation time

Table 2 – Reverberation time of 125-500Hz in the non-domestic structures at Jerf el-Ahmar, Göbekli Tepe, and Nevalı Çori

Building	Time – Empty	Time – 2/3 Full	Time – Full
EA7	0.4 – 1.0 sec	0.4 – 0.9 sec	0.4 – 0.9 sec
EA30	0.4 – 0.9 sec	0.4 – 0.9 sec	0.4 – 0.8 sec
EA53	0.4 – 1.0 sec	0.4 – 1.0 sec	0.4 – 0.8 sec
A	0.7 – 1.5 sec	0.6 – 1.4 sec	0.6 – 1.3 sec
B	0.7 – 1.5 sec	0.6 – 1.4 sec	0.6 – 1.4 sec
C	0.7 – 1.6 sec	0.6 – 1.5 sec	0.6 – 1.4 sec
D	0.7 – 1.6 sec	0.6 – 1.5 sec	0.6 – 1.5 sec
II	0.7 – 1.1 sec	0.6 – 1.1 sec	0.5 – 1.0 sec
III	0.7 – 1.1 sec	0.6 – 1.0 sec	0.5 – 1.0 sec

Table 3 – Interaction distances (adapted from Hall 1969: 126-127).

	Personal	Social	Close Public	Far Public
Distance	0.45 – 1.2 m	1.2 – 3.6 m	3.6 – 7.6 m	7.6 m+

time is longer than this ideal, echoes smear following syllables making speech unintelligible (Brooks 2003: 89; Lord and Templeton 1986: 85; Mehta *et al.* 1999: 215-217). Using information concerning the various surfaces within the structures, including stone, wood, organic roofing, as well as plaster linings, it is possible to calculate the reverberation time. While it is possible that some of the materials that originally were located in the structures have been lost, such as wall coverings, they would not have dramatically altered the reverberation time of the structures. Finally, the number of people within the structures would have altered the reverberation time, and various scenarios have been modelled using capacity estimates that are discussed later, as shown in Table 2. Taking into account all of these variables, the non-domestic structures would have provided venues for intelligible speech as the reverberation times fall within the ideal range, though it is likely that these acoustic properties were not deliberately constructed (see table 2).

Reverberation time is not the only factor that affected the intelligibility of speech, as the human body limits the distances at which people interact. Hall (1969) determined that there were defined distances at which people interacted, with differing levels of communication possible at each one (see table 3). At close public distances, speaking volume must be raised and subtle facial expressions are lost, while at far public distances gestures must be exaggerated and speech must be amplified

(Hall 1969: 124-125). Clearly, the distances at which people were interacting would have greatly influenced the types of relationships they could have fostered. Measurement of the non-domestic structures clarify the way that participants could have interacted (see fig. 10), refining our understanding of the types of events that may have been taking place within them.

The structures at Jerf el-Ahmar were small enough that the structures fell entirely within the close public distance and participants would have been able to carry on conversations with little difficulty. However, the structures at Nevalı Çori and Göbekli Tepe were very different with opposite sides of the structures further than 7.6m apart, in the far public range. This means that participants sitting on benches on opposite sides of the structures would have had difficulty conversing with one another as they were too far apart. By contrast, the centres of the structures were all within the close public distance of the perimeter, where interaction was easier than across the diameter of the space. This suggests that the centre was the focus of attention, with participants around the perimeter watching and listening to a central speaker or performer, which coincides with the location of the central standing stones, perhaps framing the activities taking place there.

A multi-sensual analysis would not be complete without a discussion of smell, despite the fact that the exploration of the olfactory experience of the non-domestic structures is still in its infancy, and is perhaps best served by a qualitative discussion of items that may have contributed to a distinctive smell. At Göbekli Tepe, Nevalı Çori, and Jerf el-Ahmar there is little to suggest that distinctive odours played any part in activities within the non-domestic structures. Of course, it is very likely that smelly items were used, but no archaeological evidence remains. For instance, lanterns or torches might have been used, as well as incense, while specially prepared foods might have been eaten. Additionally, if the structures were heavily occupied, the experience of participating in events would have included the olfactory co-presence of other participants. At some other non-domestic structures in the PPN, there is evidence for the manipulation of human and animal remains (Akkermans and Schwarz 2003: 93-94; Coqueugniot 1998: 111-112; Croucher 2005a; Kenyon 1981: 8; Özbek 1992; Ozdoğan 1999), and it is possible that similar events occurred at these sites, with the final deposition of the remains occurring elsewhere. The lack of direct evidence at the case study sites does not mean that smell would not have been an important aspect of events, especially as the anthropological and etHnographic literature have emphasized the importance of smell in memory and experience (Classen *et al.* 1994; Howes 1991a and b; Pocock 1988 and 1989; Porteous 1985; Rodaway 1994: 22-24; Stoller 1989), but simply that we have not yet deter-

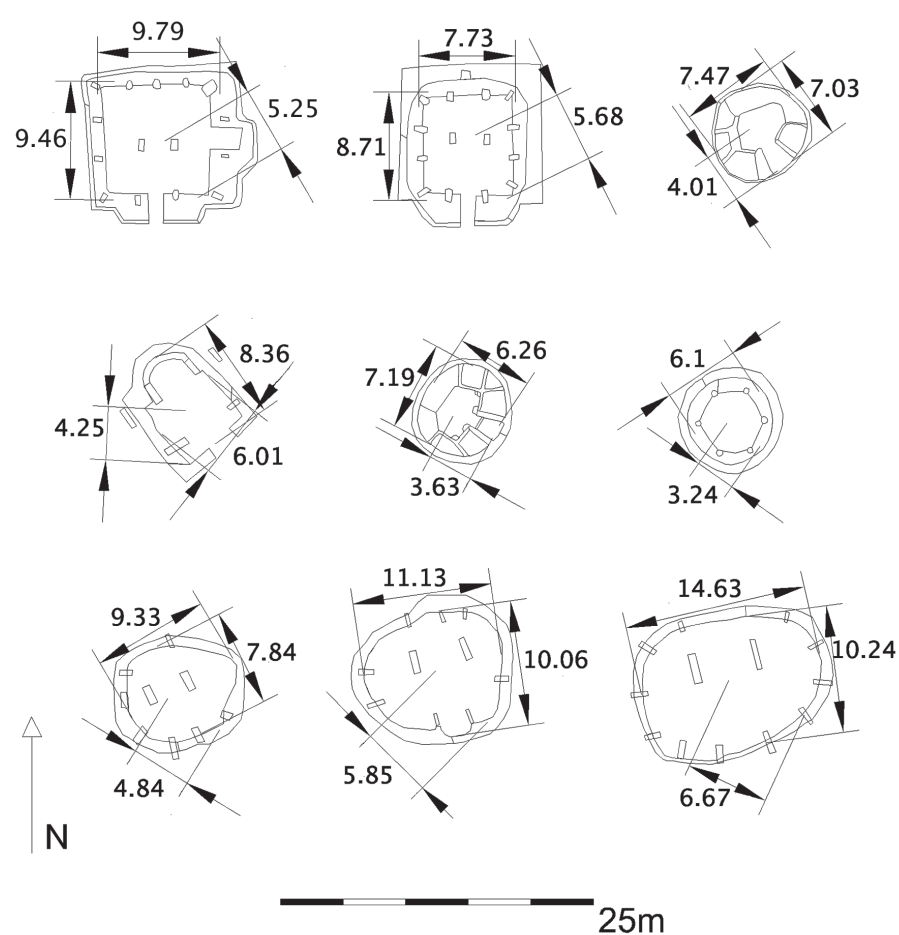


Fig. 10 – Measurement of the length, width, and radius of non-domestic structures in metres.

mined how to integrate smell into the prehistoric archaeological record. This is something that can be addressed in future research.

The way participants moved through the structures would have affected the way they interacted and the types of relationships fostered. In the case study structures, there is little to indicate any control of traffic (fig. 11). While the central pillars at Göbekli Tepe and Nevalı Çori might indicate areas that participants were meant to avoid, or conversely areas that participants must pass through, it is also possible that these spaces had no influence on movement. Other than this central space, the structures at Nevalı Çori, Göbekli Tepe, and EA53 at Jerf el-Ahmar would have been very unrestricted. Participants could have easily moved through and around the space and all participants would have had a similar experience.

The earlier structures at Jerf el-Ahmar, EA7 and EA30, had small chambers around one side of the perimeter. These cham-

bers create more complex movement paths through the structure, and while it might be argued that participants did not enter these spaces regularly if they were filled with stored materials, the existence of small steps suggests that people were indeed moving into these spaces. While these small chambers create more complex movement paths within the structures, the low walls would not have presented a real impediment to participants.

Finally, as discussed earlier, the images on the T-shaped pillars at Göbekli Tepe were dispersed throughout the structures. This could suggest that participants were required to move through the structure in order to engage with all of the images. A contextual examination of potential clockwise or counter-clockwise circuits of the structures does not indicate any pattern to the imagery, though it is likely that they represented a narrative that is now lost.

One of the most important aspects for understanding the way these structures would have been used is determining

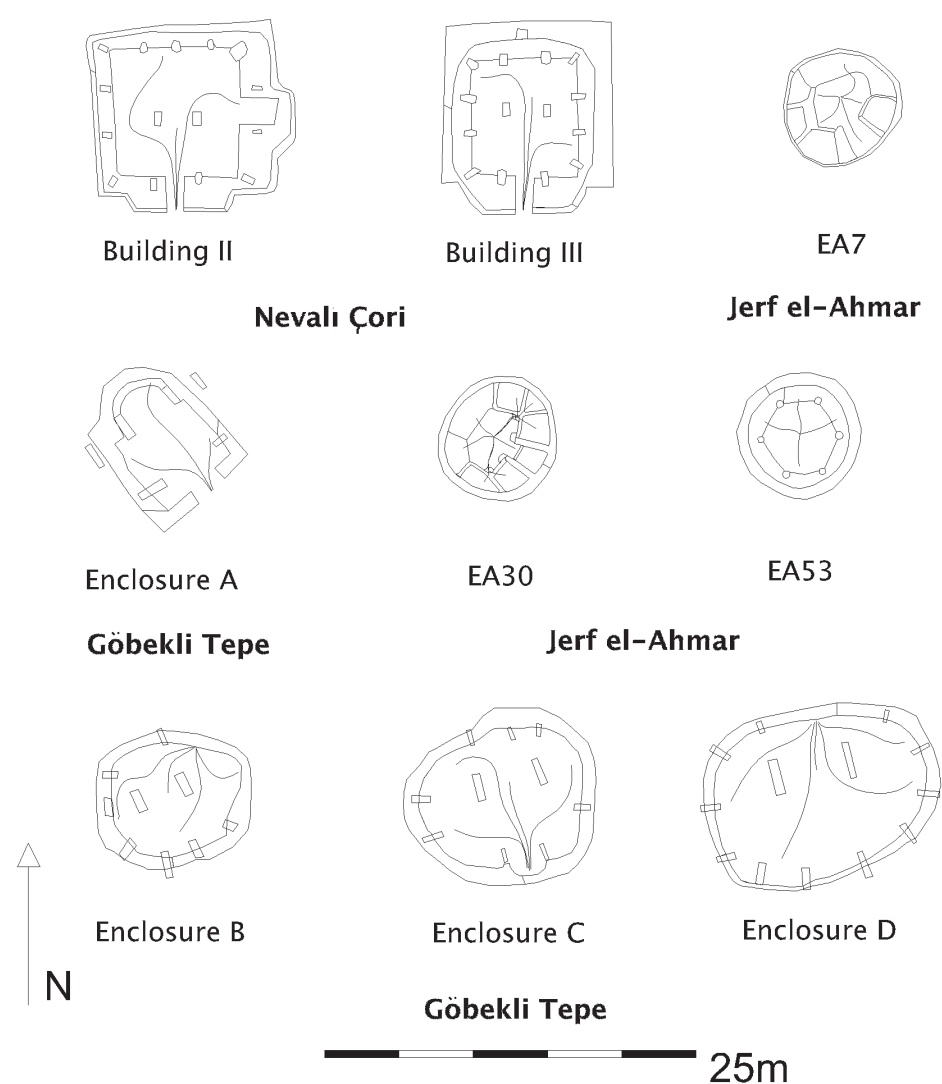


Fig. 11 – Potential movement paths through the non-domestic structures (after Stordeur et Abbès 2002 : 568).

how many people they could have accommodated. Previous studies have addressed this question without dealing with the complexities of the situation. The first studies to discuss capacity of structures looked at cross-cultural domestic space and determined that 10.2 m² per adult was necessary (LeBlanc 1971; Naroll 1962; Weissner 1974). Applied to the case study structures, this methodology estimates a very low capacity (see table 4) and has been criticised for a number of reasons (Kolb 1985: 583). Particularly, space requirements vary hugely due to cultural construction, as well as the specific activities taking place, despite the fact that the need for personal space is a cross-cultural and cross-species

norm (Baldassare and Feller 1975: 482-483; Batchelor and Goethals 1972; Bauer 1973; Draper 1973; Karlin *et al.* 1976; Kaya and Erkip 1999). Additionally Naroll's study focusses on domestic rather than non-domestic space, and individuals would have different requirements in these distinctive spaces than in common domestic spaces.

Some other studies have attempted to determine the capacities of the case study structures; however, they were not clear about the methodology used. Verhoeven (2002a: 247) appears to use a constant amount of space per participant, though this is never explicitly stated. Calculation suggests that he assigned 2-4 m² per person, and while this might be more realistic

Table 4 – Comparison of the capacity of the non-domestic structures.

Site	Building	10.2m ² /person	Max.	50%	Contextual	Bench
Jerf el-Ahmar	EA7	4.27	46	23	27	9
Jerf el-Ahmar	EA30	3.47	44	22	25	6
Jerf el-Ahmar	EA53	2.87	48	24	22	14
Göbekli Tepe	A	1.96	69	34.5	34	17
Göbekli Tepe	B	5.63	87	43.5	40	26
Göbekli Tepe	C	8.62	136	68	72	31
Göbekli Tepe	D	11.54	208	104	127	40
Nevalı Çori	II	12.09	175	87.5	93	28
Nevalı Çori	III	10.63	126	63	61	24

than 10.2 m² per person, it still does not take into account the complexities of the spaces and the evidence for the way that participants would have occupied the structures. Using representative polygons and AutoCAD, it is possible to model participants occupying the space. First, in order to delineate the extreme physical limits, the maximum capacity of the structures is modelled (see fig. 12 and table 4). This does not take into account any allowance for movement, personal space, or other activities. Obviously, this is unrealistically high, and the more realistic capacity might be estimated around 50% of the maximum capacity to account for these aspects.

Using information concerning the visibility, movement, features, and interpersonal space, it is possible to model a more contextual way that participants might have occupied the space (see fig. 13 and table 4). This assumes that participants entered the structures and took their place based on their intended activity, other participants already present, or perhaps participants had designated roles and assigned locations. As these details are lost, this contextual model is only one possible capacity, with many other scenarios possible including the possibility that only a single person occupied the spaces at any one time. Despite this uncertainty, the contextual scenario modelled here takes into account the affordances of the space, and as the spaces were deliberately constructed with these affordances, then this scenario is relevant to our understanding of the space despite the fact that it will not reflect the historical reality of the occupation of the structure. This contextual reconstruction gives a more nuanced reconstruction of the way participants might have occupied the space than models that simply assign a particular amount of space per person. Additionally, any new evidence that emerges can be easily incorporated to refine the reconstruction, making the scenarios more realistic.

Comparing the various different reconstructions of capacity shows that, as expected, the anthropological constant of

10.2 m² per person gives an estimate that is unrealistically low, while the maximum capacity gives an estimate that is unrealistically high (see table 4). Interestingly, 50% of the maximum capacity and the contextual capacity are very similar, which indicates that this is a realistic estimate for the capacity of the structures. These estimates show that the structures could have accommodated larger groups of people than domestic structures (Hemsley 2008). This is particularly true at Göbekli Tepe and Nevalı Çori, where the structures could have accommodated very large groups of people. The existence of benches around the perimeter suggests that the majority of participants would have been seated there, and if only the capacities of these benches are calculated, the group size is even lower (fig. 14 and table 4). This indicates that while the capacity of the structures was in the range of the 50% capacity and contextual capacity, the group using the structure might have been closer to the size of bench capacity.

Using the information concerning the size of the groups occupying the non-domestic structures, it will be possible to examine the relationship between the participants and the wider settlement. Future work using estimates of the population of each case study site will clarify what proportion of the community could have participated in any event within the structures, which will permit discussion of the way the events in the structures would have been perceived and integrated into the wider community. Obviously the structures would have functioned differently in communities where a large proportion of the inhabitants could have been accommodated than a structure where only a small percentage of the community could have participated at any one time, even if the capacity of both structures were roughly similar. This analysis requires estimates of the population of the settlements though, and this is a difficult issue that is beyond the scope of this discussion.

DISCUSSION

These analyses give insight into the activities taking place in the case study structures, and indicate that they were perceived as significantly different from other structures. These spaces were constructed to provide venues to permit gatherings of larger groups of people than would be permitted in domestic structures (Hemsley 2008). The spaces were very undifferentiated and open, meaning that all participants would have shared a similar experience and perception of events. The evidence suggests that at both Nevalı Çori and Göbekli Tepe participants would have been generally seated around the perimeter, watch-

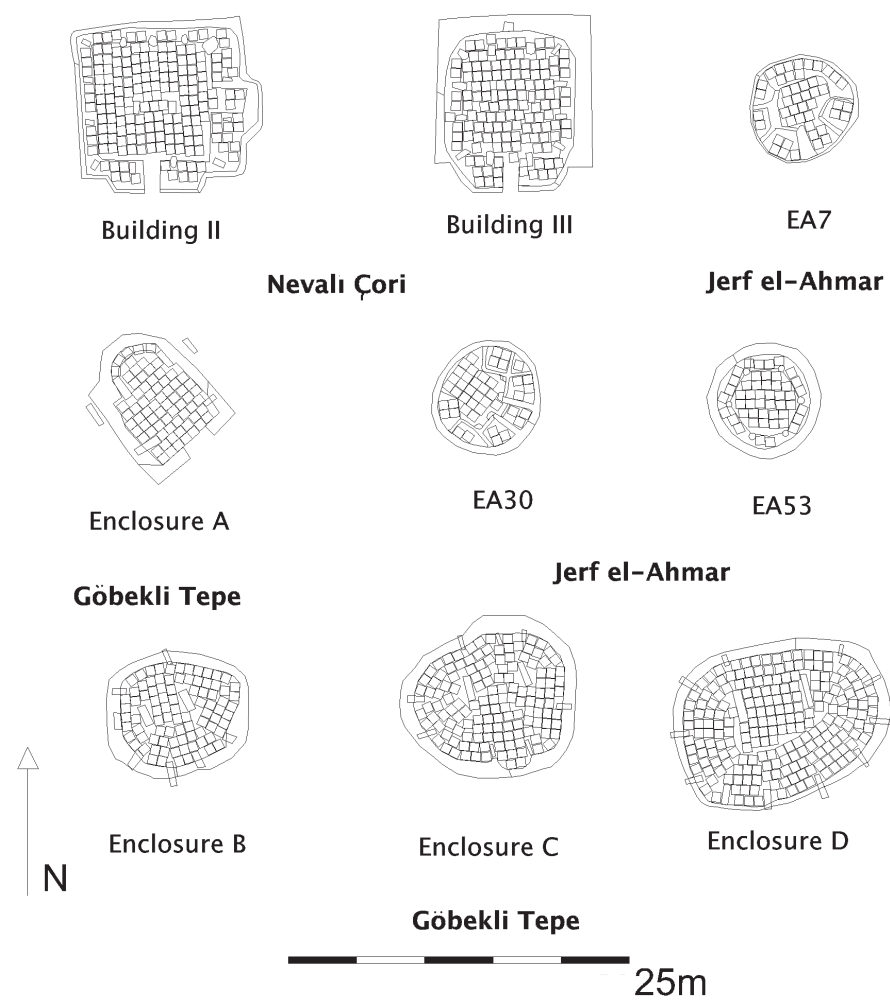


Fig. 12 – Maximum capacity of the non-domestic structures.

ing and listening to a central performance. While this indicates an audience/performance relationship, it was not necessarily a hierarchical relationship, particularly as the structures were very undifferentiated. It is of course possible that the central performance was organised and implemented by a specialist, but it is also possible that all participants took turns speaking or performing at the centre. This could be the result of many different types of activities, such as theatrical performances, council or judicial proceedings, religious ceremonies, or rites of passage. At Jerf el-Ahmar, the bench segments also suggest an audience, but the smaller size indicates that there would have been more integrated participation, such as in debates or a participant performance, rather than an audience/performer relationship.

The details of the non-domestic spaces would have created intense and significant shared experiences. Imagine participat-

ing in events in a large, darkened space, perhaps with flickering torches, surrounded by towering humanoid figures. These figures would be significant, recalling previous participants, deities, guardians, or some other important figures. At Göbekli Tepe and Jerf el-Ahmar, there were other images filling the space, while there might have been statues displayed in the niches at Nevalı Çori. There is little evidence for the use of other symbolic items within these spaces, but it is tempting to speculate whether items similar to those found at other sites, such as masks, costumes, statues, and activities such as dancing, singing, and storytelling, were being used (Garfinkel 2003: 86-89; Russell and McGowan 2003; Schmandt-Besserat 1998).

All of these lines of evidence point to the deliberate construction of spaces that would have facilitated the creation of shared intense experiences. This suggests that instead of

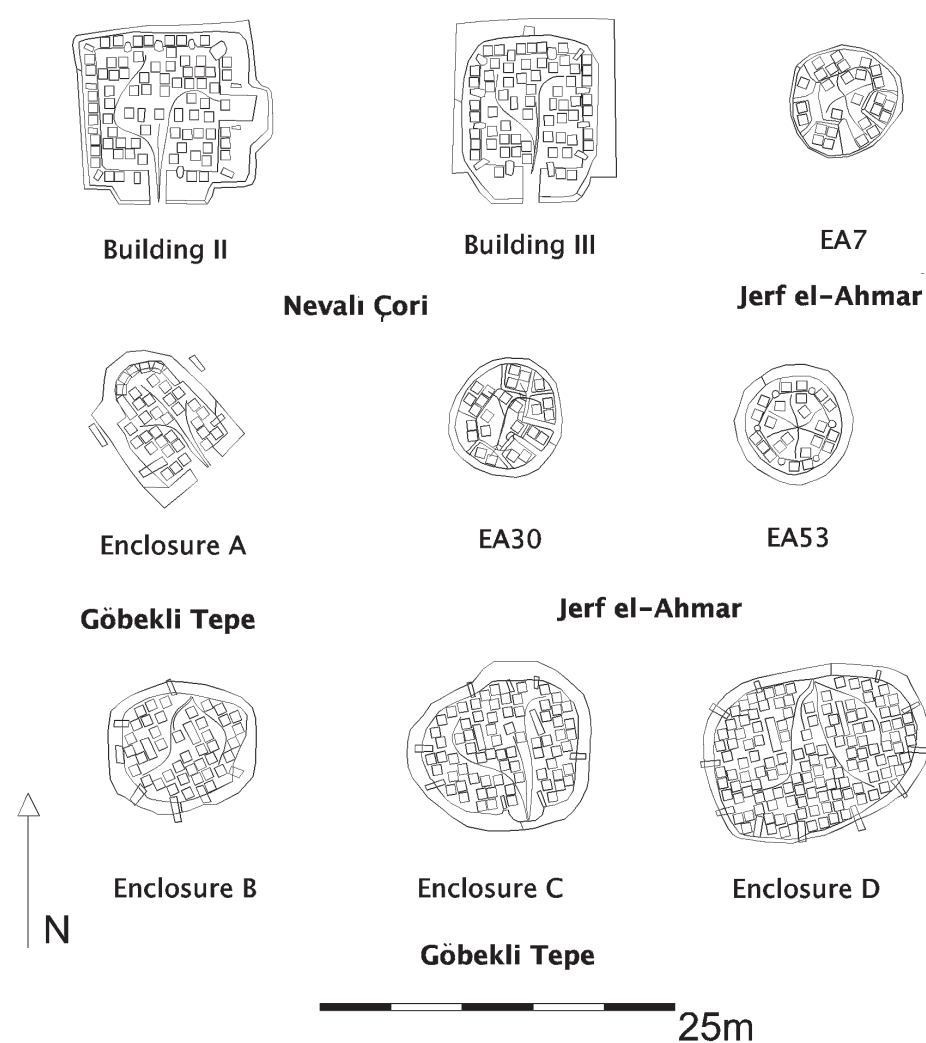


Fig. 13 – Contextual capacity of the non-domestic structures.

emphasizing differing relationships between groups of participants, the spaces created shared identity. Shared emotional experience has been shown to create tight bonds (Whitehouse 2002: 307), and these spaces would therefore have facilitated and maintained community cohesion through shared undifferentiated highly charged experiences.

CONCLUSION

A contextual, site specific analysis of the physical affordances of the non-domestic structures demonstrate that performance would have been a very important aspect of activities

taking place in these spaces. The biggest variation between the structures was the degree of participation that would have been possible within the groups using the structures. In the smaller structures of Jerf el-Ahmar, participants could have interacted in a very direct and integrated way, while in the larger structures of Nevalı Çori and Göbekli Tepe, participants would only have interacted indirectly, through a central performer or speaker. Examination of the interior demonstrates that the structures were very open and undifferentiated, with the emphasis on shared highly charged experiences rather than materializing and creating hierarchical relationships.

Estimates of capacity based on floor area have been undertaken previously, and taking into account the details of the interior and the effects on vision, movement, and other

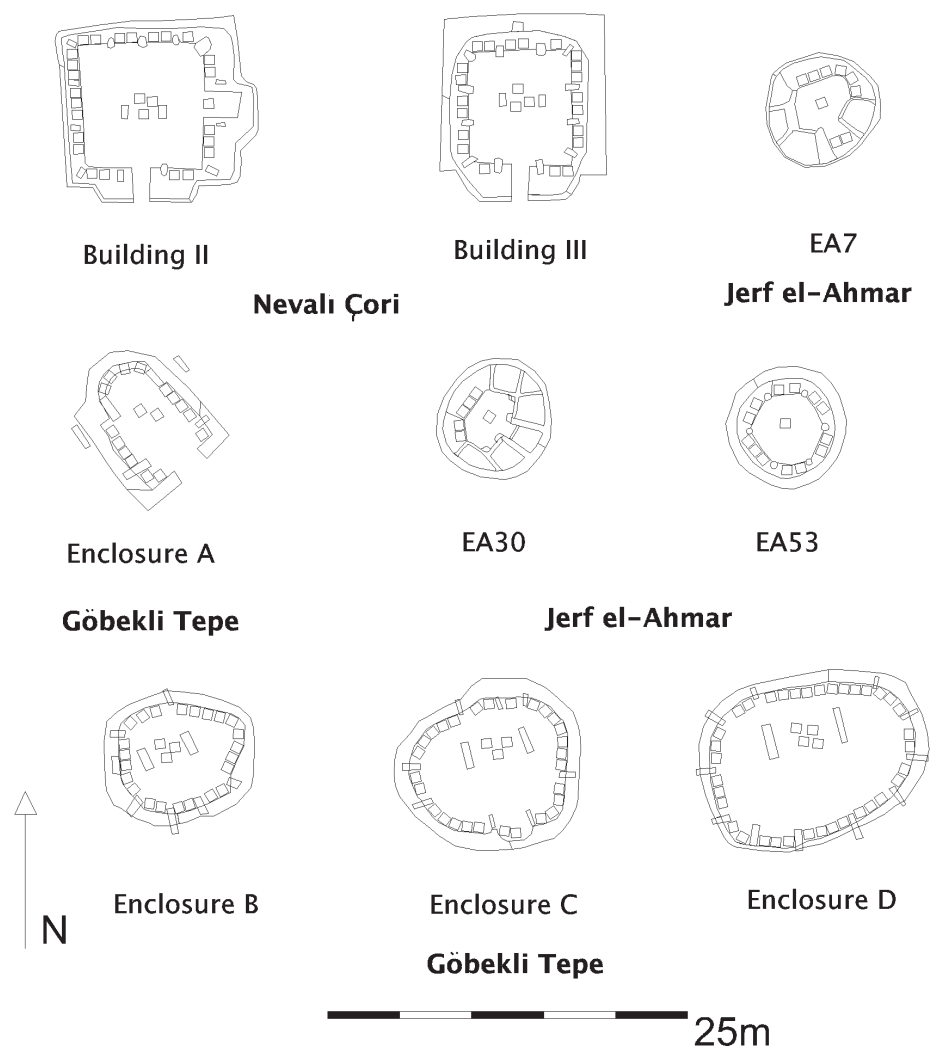


Fig. 14 – Bench capacity of the non-domestic structures.

features we can model a more realistic estimate of the group using the structures. While the exact size of the groups using the structures is simply an estimate, modelling the capacity in a contextual embodied way gives a more nuanced understanding of the space. This embodied methodology clarifies our understanding of the way the structures would have been perceived and used, enhancing our understanding of the way Near Eastern Neolithic communities would have functioned.

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