Gobekli Tepe: a 6th millennium BC monument

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Abstract

This paper is a sequel to the author's paper in reference [1]. Material here is not duplicative, thus the two papers need be read in sequence. In the earlier paper evidence was presented which established that Gobekli Tepe's Layer III (for structure D) part of the monument, the oldest structure (excavated thus far) at Gobekli Tepe (GT), is post PPNB construction. This paper adds more to that evidence, and proposes a date for GT's initial Phase for structure D: late Mesolithic. Specifically, the paper expands on refuting the generally accepted dating of GT, evidence that is based on carbon-14 dating of enclosure C, set at 7560 – 7370 BC which, as pointed out in [1], was in turn based on contaminated evidence from the fill. This paper also expands on the Central Place Theory notions from Economic Geography first suggested there, in placing GT within a spatial and temporal context. Basically it establishes that a complex cultural center the size of GT could not have appeared in a vacuum and at the time period of the Younger Dryas.

On the basis of new comparative architectural (structural and morphological) analysis this paper documents that the construction date of enclosures C (the major two-ring stone enclosures of GT excavated thus far) should be 5000 +/- 250 years BC. It is argued that GT's construction is slightly earlier than the stone ring at the western end of Carnac' Le Grand Menec (circa 4500 BC) and later than Catalhoyuk and Nevali Cori's Mesolithic construction. The claims on setting upper and lower limits on GT's structures C and D initial construction Phases are based in part on analysis of certain time-marking monumental structures' floor plan and a scheme developed by Alexander Thom on stone circles and ring structures, further expanded by this author and given a temporal dimension. It is also argued that the site was buried at the start of the Bronze Age,

GT as an active ceremonial site lasted well into the Neolithic. This paper concludes that the burying of the GT structures was to an extent malevolent. It also expands on the role shadows played in the positioning of the T-shaped megalithic pillars and orthostats inside each structure.

A note on chronology

Pre-pottery Neolithic A (PPNA) is considered to be the period 10000 BC – 8500 BC; pre-pottery Neolithic B (PPNB) is the period 8500 – 7000 BC; Mesolithic is the period 10000 – 5000 BC, whereas Neolithic is the 5000 – 2500 BC period. 2500 BC is considered to be the beginning of the Bronze Age in Europe and the Fertile Crescent (including Egypt and Mesopotamia). Chalcolithic is considered to be the period from late Mesolithic (circa 6500 BC) to the Bronze Age. The 7000 BC cutoff point is adopted as a 5-century long period-boundary to the Mesopotamian Ubaid period [11], a period commencing circa 6500 BC, when a confluence of events occurred: metals mining (especially copper) commenced, the potter's wheel was discovered, and key demographic, geographic, social, economic, urban and architectural developments took place,

significantly altering the way human settlements formed and self-organized in space. Some key factors in that transition we analyze here, as they pertain to GT's historiography.

It is recognized that many authors and analysts employ different chronological sequences and periods in discussing matters of Archeology. However, this author considers the above breakdown as the most efficient, informative and accurate in roughly depicting the significant social and environmental events that marked the period following the Upper Paleolithic as punctuated by the Younger Dryas environmental event, and before the Neolithic megalithic monumental explosion of the 5th, 4th and 3rd millennia BC, that eventually led to the emergence of the Bronze Age in the second half of the 3rd millennium BC.

Spatial and temporal contexts

Gobekli Tepe in a Central Place Theory framework.

To fully understand GT one must place it and its Architecture in its proper space-time context. Doing so implies linking it to neighboring human settlements surrounding it in a Central Place Theory (CPT) framework, and to their evolution. A CPT framework allows one to conceptualize the hierarchical network of a setting's two-way spatial interactions and influences (in affecting and being affected by a milieu). It must be argued that a complex monumental structure of GT's scale could not have appeared out of the blue, on virgin territory, in isolation. It must have been a part of a network of human settlements, and as its large scale indicates, a part of a significant and spatially expansive network of centers of a lesser scale.

In [1] this author produced evidence, based on Economics, Demographics, Urban Planning, Urban Design and Architecture to document that GT is a post PPNB construction, i.e., a post 7000 BC ceremonial center of a considerable in scale spatially diffused sedentary residential activity. The current archeological community refers to it just as an isolated "sanctuary" visited by peoples living far away from the site. In [1] the author argued that GT must have been far more than just a sanctuary, given its scale, and in the middle of a considerable in terms of population size network of human residential settlements surrounding it. This aspect of GT is expanded here.

In reference [13] a survey is found of 35 Mesolithic and Neolithic Upper Mesopotamian archeological sites in the broader region where GT is situated, given by their geographic coordinates. Dating of all these sites is primarily based on carbon-14 analysis of either their structures or their fills. In certain instances this dating technique is accurate, especially when successive layers of construction are involved at a particular site. Certainly it is not accurate when a one-time filling of the monument without any later construction on top of it is to be used, since dating based on the fill's carbon-14 analysis, as pointed out in [1] is misleading in this case. This author will take (with the exception of the carbon-14 dating of Gobekli Tepe) as valid evidence

of Mesolithic construction all the rest of the monuments listed in [13], but only for the purpose of establishing a network of Mesolithic human settlements in the region.

Following is an attempt to delineate the region in question, and estimate its size, based on the geographic coordinates of the 35 sites in [13]. The northernmost site listed (Cafer Hoyuk) is at 38°25'N, while the southernmost (Bouqras) is at 35°3'N. The easternmost (Shimshara) is at 45°0'E, and the westernmost (Mezraa/Teleilat) at 37°59'E. Parenthetically, ref. [13] erroneously has GT's longitudinal coordinate at 36°55', whereas the correct GT longitudinal coordinate is 38°55'. This Upper Mesopotamian region (as covered by that survey) represents an approximate 200 miles (north-south) by 330 miles (east-west) rectangle with Gobekli Tepe close to its western border, about one third down from the northernmost latitude.

What this area clearly indicates is the following: first, GT was at the very center of a teaming Mesolithic Upper Mesopotamian human settlement activity by the time it came about; and that given its approximate 330 mile distance to Catalcoyuk (to the east) it means that GT was at the very core of a Central Place Theory human settlement hierarchical structure covering a longitudinal spectrum of about 650 miles and a latitudinal spread of about 200 miles. Thus, one now can appreciate and understand its scale as a dominant human settlement at late Mesolithic early Neolithic (circa 6000 BC) in the Upper Fertile Crescent region. This detailed spatial analysis provides further support to the arguments in [1], that GT must be viewed as a core human settlement in that region of the Fertile Crescent and Mesopotamia in a CPT context.

The current archeological community considers GT to be a PPNA/B structure i.e., a pre-7500 BC monument, some even consider it to be a pre-9000 BC construction [13]. They base their evidence in part on carbon-14 dating, obtained from both the fill with which GT's structures were buried and from the plaster on certain structures' pillars dressing. The author argued in [1] that fills do not date structures, and that whatever carbon-14 dating is produced from a PPNA/B fill is not reflective of GT structures, as these structures have been contaminated by the fill. Similar contamination of the evidence includes the plaster that has covered the T-shaped pillars and orthostats of GT's enclosures. Moreover, demographic evidence was presented to argue that the early Mesolithic population in that region could not support a monument the scale of GT. Finally, architectural, Urban Design and Urban Planning based evidence was presented to demonstrate that GT had a number of older sites in the northern Mesopotamian Fertile Crescent Region pre-dating it in their simpler Architecture, Design and Planning configurations.

Here, more evidence is supplied to back the author's claims that GT is a post 7000 BC construction. The new evidence is based on a morphological and structural analysis of settlements within the regional hierarchical network of GT and pre-dating GT. That network of spatially distributed human settlements were forming clusters within a CPT framework. Their respective population and capital stock sizes (i.e., their building types, their Architecture and Engineering), formed a frame of reference for GT. They include the following specific Fertile Crescent and Upper Mesopotamian sites: Jerf El Ahmar (156 miles southwest of GT), Cayonu (75

miles east of GT), Nevali Cori (30 miles northwest of GT) and Catalhoyuk (333 miles east of GT) in their various phases of construction. Due to their Architecture, these sites must be viewed as offering a *terminus post quem* for GT. In this paper, and in a comparative context, their influences are considered in a geographical distance-based framework of spatial inter-connectivity and interaction flows affecting GT's scale and cultural activities over space and in time.

Inter-spatial architectonic influences.

On the architectonic and engineering fronts, evidence about morphological influences are traced, particularly linked to the morphology of GT. The approximate rectangular structures at Catalhoyuk (see reference [18] for a detailed description of all buildings excavated and studied thus far), Cayonu and Nevali Cori (which in addition sported simpler and smaller orthostats and T-shaped pillars as encountered at GT) are discussed. The pseudo-elliptical shaped stonemasonry wall enclosed structures of Jerf El Ahmar, qualitatively very similar to GT's structures C and D, although far more archetypal, define a nodal point in floor plan evolution. On the other hand, evidence from the pseudo-elliptical architectural design of stone circles at Carnac in Brittany (through the early Neolithic, circa 4500 BC, construction at Le Menec, see [2] and [3]) are viewed as offering a *terminus ante quem* on GT.

The regression from a rectangle *cum* orthostats geometric form at the near to GT but directly on the Euphrates River settlement of Nevali Cori (a key site of reference for GT's Architecture) to a pseudo-elliptical morphology influenced by Jerf El Ahmar (another key site in this analysis) is analyzed, and the time sensitive forms are used to further calibrate the dates of construction at both Nevali Cori (and Catalhoyuk). Moreover, GT's Architecture is seen as having influenced that of Le Menec's western stone enclosure at Carnac. This particular enclosure, along with a large number of stone enclosures and ring circles found at the middle to late Neolithic and at the early Bronze Age on the British Isles, have been analyzed with a typology produced by Alexander Thom. This typology is a subject addressed at some length in this paper, as it bears directly on the morphology of structures C and D at GT. Influences from GT to the Maltese Architecture and Art, as well as to the monuments at Menorca are touched upon at the Appendix of this paper.

Key in understanding the flow of influences, during the late Mesolithic and early to middle Neolithic, between the Western European Art and Architecture (Brittany and the British Isles) and that of the Fertile Crescent (including Mesopotamia and Egypt) is **Malta.** The Maltese Archipelago (specifically the early temples at the islands of Malta – initial Hagar Qim and Tarxien phases – and especially the island of Gozo, with the Ggantija phase temples) was at the crossroads of such inter-spatial and inter-temporal influences. Recording the direction of these influences and their timing is critical in understanding the Architecture of both the Fertile Crescent Region and that of the North-West Europe in the Neolithic.

The strong links in Architecture and Art between Malta and GT are demonstrated in a brief analysis and a set of photos in the Appendix "Gobekli Tepe and Malta, Stonehenge and Menorca". Similarities between GT and Malta are evident at the macro and micro scale. On the architectural front, the concept of inserting orthostats in shaping the arcs of dry masonry walls, as well as the hierarchical clustering of pseudo-elliptical monuments are concepts in which the Maltese architect was clearly influenced by GT site and floor plans. On the artistic front, the iconography of friezes, reliefs and sculptures depicting small groups of lined up animals is a feature highlighting the GT influences on Maltese symbolism and Art. Their equivalences are indeed striking.

GT appeared at the edge of the transition from the extensive, spatially dispersed, relatively low population density, rather autarchic in agricultural production and consumption network of human settlements of the Upper Mesopotamian, to the dense and densely populated settlements of the Lower Mesopotamian region (centered around the early Phases of Uruk), in the so-called **Ubaid Period**. That transition saw a shift in locational comparative advantages from the upper sections of the Euphrates River (in what is today eastern Turkey, eastern Syria and northern Iraq) to the lower Euphrates and Tigris River flatlands in southern present day Iraq and Kuwait. That North to South shift was primarily due to a drastic change in agriculture based trade patterns. It was a major, tectonic in scale, shift resulting from a transition in the organization of human settlements from autarchic in foodstuff (but based on trade in obsidian) communities of Upper Mesopotamia, to agricultural and mining trade-dependent human settlements of Lower Mesopotamia. It was a period of significant advances in riverine and maritime transportation, human migration and flow of peoples, commodities and ideas from Mesopotamia to Europe.

Along with that transition, riverside communities and human settlements in Upper Mesopotamia (like Nevali Cori) gave way to more inland and mountainous residential patterns for their cultural centers, an escape to more secure higher grounds (like Gobekli Tepe). Flat lands, defenseless and lacking walls direct river-accessible locations, became vulnerable to outside raids. The walled settlements, trade dependent densely populated urban areas of Lower Mesopotamia were about to succeed the low density, autarchic defenseless towns of Upper Mesopotamia. It was the time when the era of Empires was dawning, and trade flows were becoming their backbone, blood and lifeline. The profound implications of this transition created gales of technological change, emergence of new cities, and with it new Architecture and Design. It is within this phase transition in urban dynamics that GT must be viewed. The beginning stages of that transition was its rise; the end phase of that phase transition saw GT's fall and burial.

Tracing architectural design and construction details within that critical phase transition among spatially and temporally neighboring communities to GT offers a window into this period and an appreciation of the socio-cultural forces which shaped the urban landscape of that region of the Fertile Crescent in general and GT in specific during the pre-Ubaid transition phase. By the time that transitive phase was over, GT had vanished, buried, but apparently not totally forgotten.

Some of its iconography and symbols survived and migrated not only south to the nearby Akkadian, Summer, Assyrian and Babylonian cultures that followed, but also to faraway places in different lands and seas, to the Mediterranean basin and beyond, to Malta and then the British Isles and then later on down to Menorca. These are the broader themes discussed in this short paper, along with certain architectonic details, as in Architecture of a period, the period's culture is reflected. In site plans and stone structures, forms and their dressing one can read cultural influences and prevailing socio-economic conditions. This is exactly what we are set to do here.

Besides floor and site plans, another architectural and design issue extensively discussed here is the processing and dressing of GT's T-shaped monolithic megalithic orthostats and pillars, into orthogonal shapes with a very refined processing (dressing). This practice is encountered in the Maltese (Hagar Qim) Temples Phase, an early 4th millennium BC construction tradition. Certain pictograms and motifs carved on GT's megalithic stones are also found carved on the Maltese Tarxien altars.

Friezes from GT are analyzed as to their late (post PPNB) iconography and style. It supplements similar analysis of the Art at GT found in [1]. More broadly, the megalithic stones' overall processing and shaping as well as dressing and coating, in combination with the terrazzo type floors at structures C and D (a feature also encountered at Nevali Cori), and the setting of the megaliths on pedestals (bases) at GT is carefully reviewed, since it hardly matches PPNA/B architectural construction anywhere in Western Eurasia.

Topography.

GT was not built inside a hill; the hill it was found inside is an artificial tumulus (a topographic tell), which was largely made by humans. The tumulus was intentionally constructed to bury the structures currently known as "structures A, B, C, D, E and F", with an unknown number of such structures still to be excavated. These structures have been interpreted by the archeologist in charge of the excavation, Klaus Schmidt, and many others who have written about the monuments at GT, as being "sanctuaries" at the time of their construction, an interpretation which we shall review and analyze to an extent in this paper. The intent to bury the structures remains largely unclear and unexplored, and here some analysis will be supplied, to determine whether the intent was benevolent or malevolent or both.

At present, the site is at an elevation above current sea level of about 2500 feet, according to Google Earth map of 7/23/2016. When made, see Figure 1, these structures were at the ground level of a mountainous gently sloped landscape, dominated by the hill on which the GT cluster of monuments is located. The monuments excavated thus far do not exactly sit at the very top of the mountain itself, but their foundations rest on the bedrock of a natural elevation.

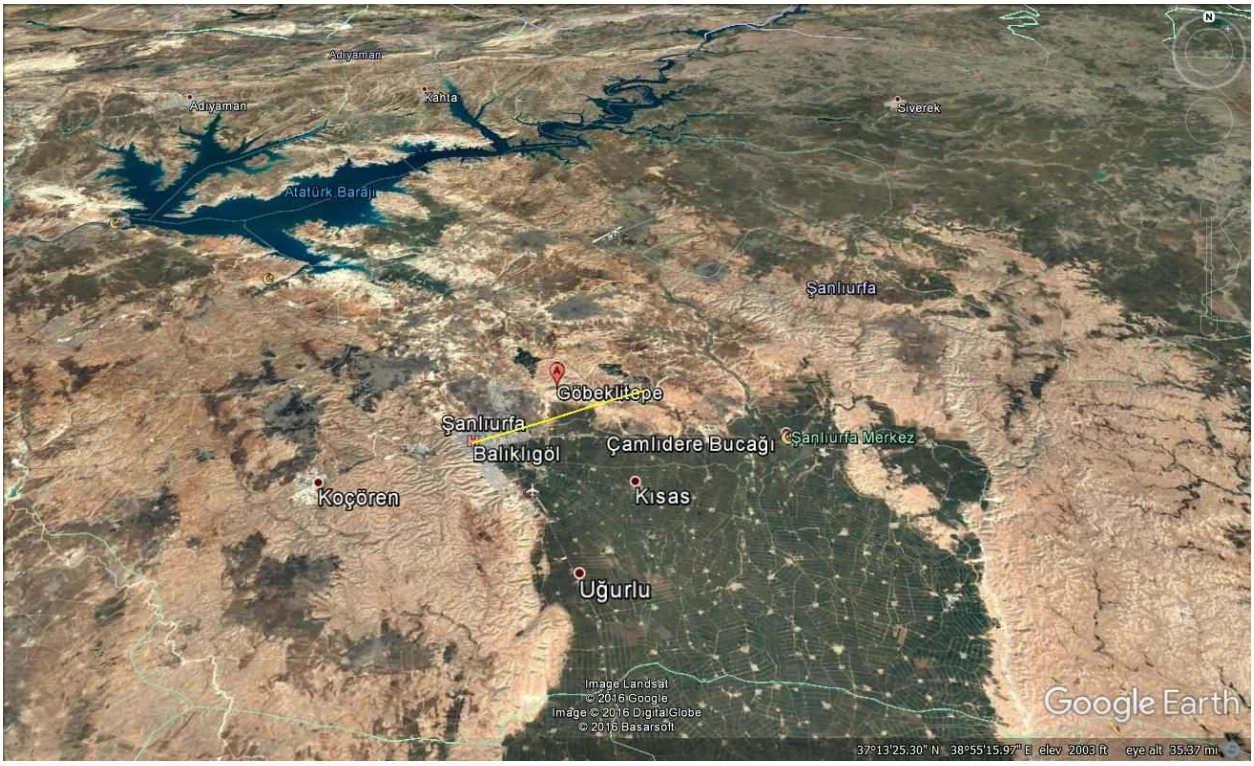

Figure 1. The broader region of Gobekli Tepe. The Euphrates River (now a dam) is approximately 27 miles to the northwest; the distance (as shown) between Urfa and Gobekli Tepe is about ten miles. Flat, abundant and fertile agricultural land is to the south of the site. Nevali Cori (now inundated by water due to the dam) was about 30 miles northwest of GT at the upper left hand side. Photo taken from an altitude of about 35.5 miles. North is up. Source: Google Earth maps.

A closer look at the area excavated is shown in Figure 1.1, from a Google Earth map. The photo shows the serpentine mountain ridge the site is at, set at almost the top at the very center of the photo. To the northwest, a mild mound is situated, shown in Figure 1.2 but not so as to block the sunset of the summer solstice. More detailed views of the site are given in Figures A2, A3, A4, and A5 at the Addendum to the paper. They potentially depict areas on the mountaintop where potentially neighboring sites of archeological interest might be lurking. Mountain crevices are ideal spots offering considerable security and protective coverage for Neolithic residences perched on a hill, taking advantage of the ground's gentle slopes to anchor apse type stonemasonry construction sporting broad vistas, while freeing up flat land for agriculture related uses. This must be kept in mind while analyzing GT's surrounding settlement sites of 5000 BC.

The viewshed of the site is towards the north and partly to the west. The site is flanked by a mound couple of dozen feet above the site, extending from the east to the south, see Figure 1.2. The sunrays would hit the pillars and the orthostats of GT's northernmost structures (from structure D and above) at sunrise between the spring and autumnal equinoxes, but blocked from

the sunrises between the autumnal and spring equinoxes. It is unknown why that specific location was chosen to build the system of structures found at GT. The site is situated relatively close, hundred meters or so, from where the megaliths used as orthostats and pillars were quarried.

Figure 1.1. The location of Gobekli Tepe's system of structures (37°13'23"N, 38°55'21"E); the monuments are situated almost at the top of an elongated fishbone or serpentine shaped mound running on a northwest to southeast direction, at an azimuth of about 120°. Access to the site was from the southwest, as is today. The photo is taken from an altitude of about 12000 feet. North is up. Source: Google Earth map.

As the surrounding area is relatively flat and currently used for agriculture, it is very likely that more than one (possibly a set of) thriving human settlements of considerable scale must have been nearby during the Late Mesolithic and Early Neolithic, a number (35) of them already discussed. The region in that specific section of the Fertile Crescent is quite close to the River Euphrates, and undoubtedly this aspect of locational comparative advantages was a major factor determining the choice of the site and the ensued scale of the monument. The gentle slopes of the mountain were areas of cultivation since the Mesolithic era, and agriculture has been the locals' occupation on those slopes to this day. The abundance of PPNA/B material found in the fills of GT's structurers as well as off them constitute evidentiary proof of such abundance. Aspects of Demography, Spatial Analysis, Economic Geography and Central Place Theory related

topics and applicable to the scale of GT's monumental structures and its broader region are addressed in [1].

Figure 1.2. The yellow line depicts a gently shaped, contour-following topographical distance of about half a mile northwest from the monument; the archeological site of Gobekli Tepe is situated on a plateau which links to the north with another mound through a promontory seen in this photo to the upper left. The site is flanked to the east and south by a slightly higher hilltop, and so is too from the northwest. Photo is taken from an altitude of about 5400 feet above ground level. North is up. Source of photo: Google Earth maps.

Around the site, areas of quarrying limestone abound, as a major reason for the mound to have eroded is the quantity of quarrying that has taken place there over the millennia. To this day, some pillars are still in the ground, not fully separated from and levered out of their bedrock source but partially shaped. One of them, even seven meters in length and three meters wide, according to K. Schmidt's description of the terrain [24] is still *in situ*. This amount and scale of quarrying activity alone is a very strong indication of the intensive use of the area, not only as a source of stones for monumental construction but also for agriculture and living (residential) activity as well. Lithic evidence found in the fill and all around the site attests to that. All this activity is the result of sedentary living, a lifestyle in which residents acquired the right to claim

land for ownership and use, and place a stake on it. These are not patterns of a mobile, migratory population, using land as a fly-by operation.

In considering the manner in which this site was buried, and the amount of quarrying and soil removal involved allows one to gauge the extent of land use intensity and densities occurring there since the late Mesolithic. The exact amount of soil used to create the artificial tumulus to bury the GT system of monuments must have been significant. See the interior of structure C in Figure 1.3, for an appreciation of the amount of soil needed to just fill on enclosure. A well with a 7-meter diameter and a height of about seven meters (the approximate average volume of the GT structures A, B, C, and D's Layer III) requires about 270 cubic meters of soil to be filled. Five wells of that type would require more than one thousand cubic meters of soil. And that is only to fill the interior space's volume.

The overall artificial tumulus is about 200x300 meters, and about fifteen meters in height, see [5]. At the time of the structures' burial the tumulus height must have been even greater. That's about one million cubic meters of soil. Where did all that fill come from is a topic which when resolved might shed considerable light on the chronology of the site. Most likely, at least part of the fill must have come from the quarry, source of the considerable number of megalithic stones utilized in GT's monumental construction. It must also have originated in places where PPNA/B activity took place, thus the source of its carbon-14 dated material in it. Tumulus soil erosion over the millennia exposed the tip of the pillars that led in the 1990s to the discovery of the entire site's buried structures.

Figure 1.3. Gobekli Tepe structure C during excavation. Source: [15].

The site plan.

The site's regional Macro Geology has not undergone significant change since the monument's construction and burial. Sea level during the late Mesolithic to early Neolithic at that part of Asia Minor were a few meters below its present level, see [12]. Save the effects from the recent dam, the broader large scale landscape must not have looked very different than what it is now. In Figure 2.1 the site's excavation area as of 2000 is shown in more detail. In that site plan and contour topographic map, the 2-hectare area under excavation is shown.

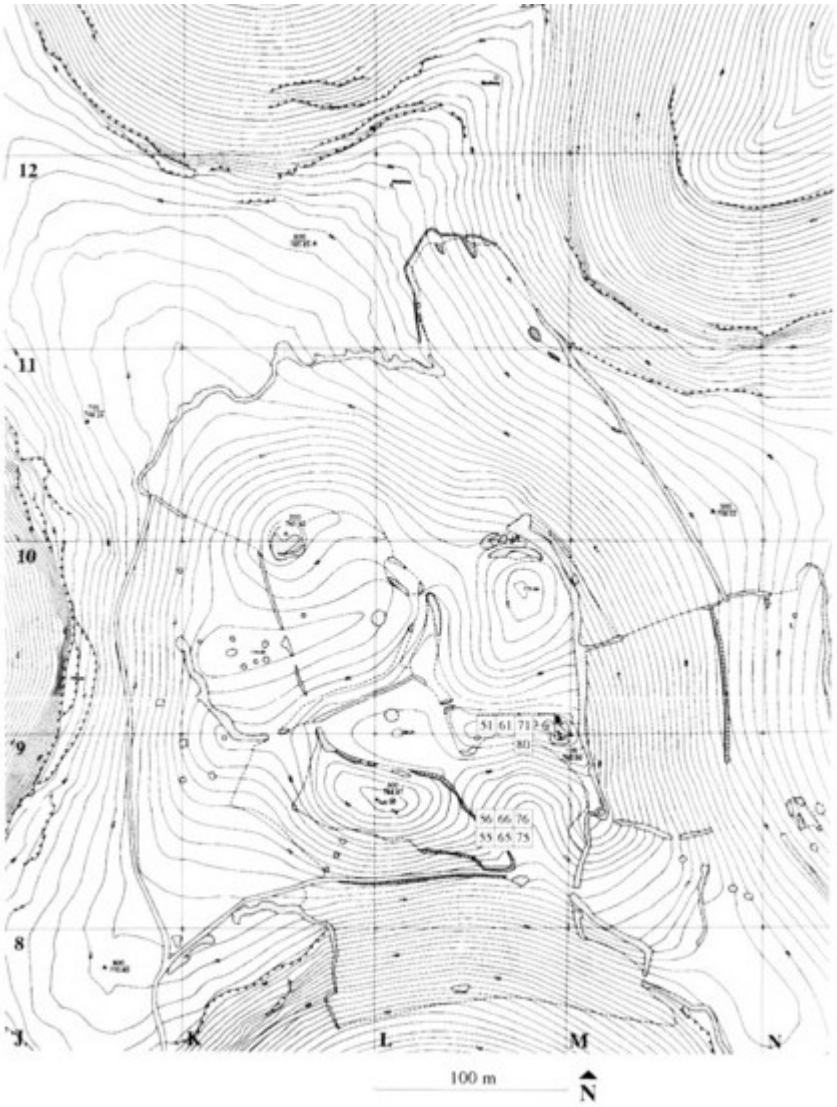

Figure 2.1. Gobekli Tepe, excavation site map showing the extent of the archeological area. Structures A – F are found in the vicinity of the 100x100 meter square defined by the coordinate points (L, M - 8, 9). Source: [4].

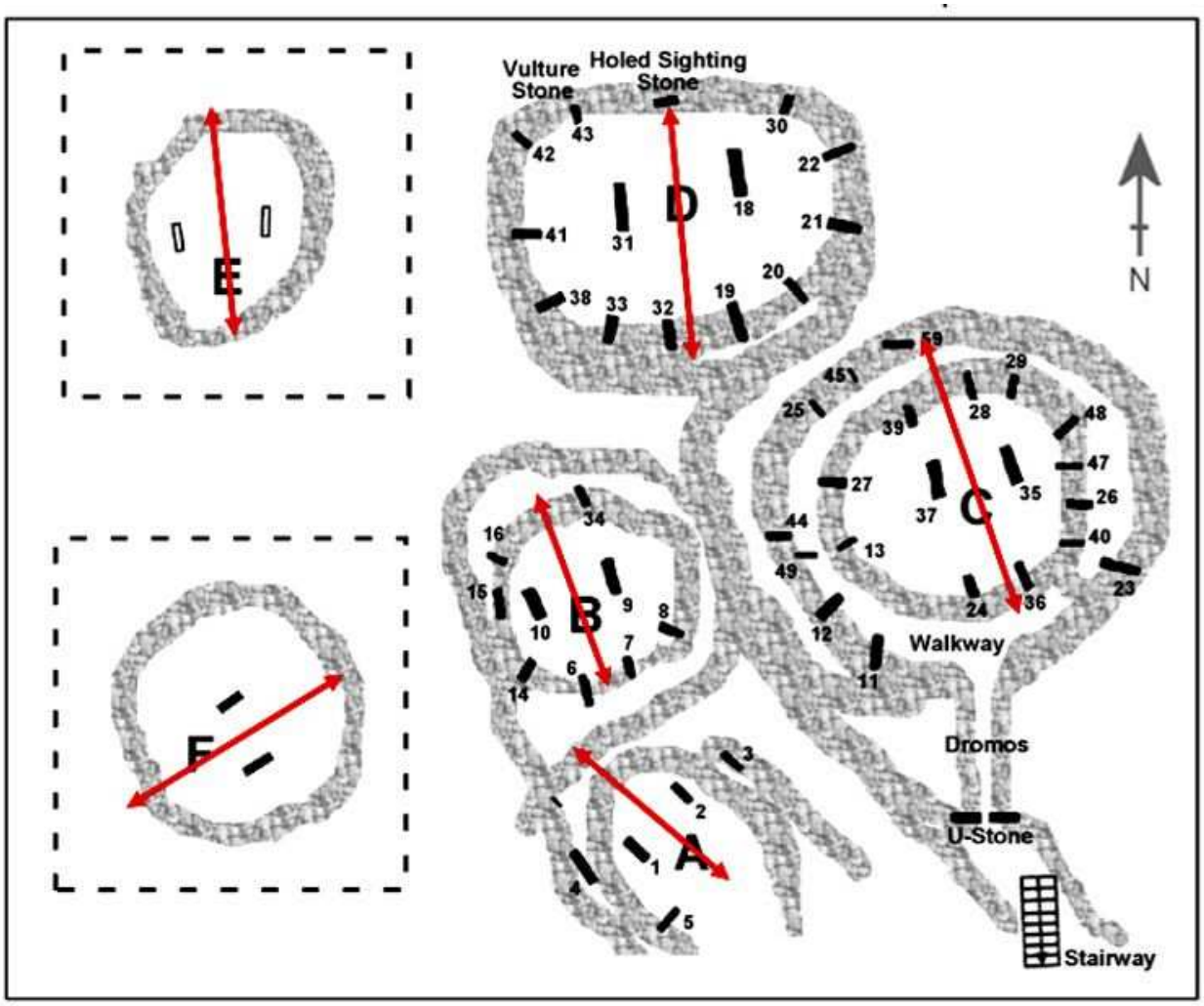

Figure 2.2. Gobekli Tepe's six structures known so far, enclosures A, B, C, D, E, and F, including the pillars and orthostats' numbers, according to a Rodney Hale's unscaled schematic floor plan diagram, as provided by A. Collins in source [5]. The inner rings are the oldest layers, designated as Layers III. The structures take an area of about 60 meters by 50 meters i.e., about a third of a hectare. The archeological team in charge of the excavation estimates, on the basis of ground penetrating radar readings, that not even a sixth of the entire site's enclosures have been excavated. It must be noted that not all of the unexcavated thus far enclosures are of the structures C and D size or type. Most likely, based on chances drawn from the six enclosures already excavated, the unexcavated circles likely involve type/size A, B, E, and F structures. Structure C seems to be the dominant enclosure in terms of size and complexity; structure D is intermediate in import, followed by enclosures B, A, F, and E in that hierarchical order. Not showing on this graph is a rectangular enclosure at GT, see Figure 2.3. The orientations of enclosures C and D as drawn in the above diagram by R. Hale are not those according to this author, see Figures 2.7, 3.1, 5.3 and 5.4. In these Figures the difference between the pillars' orientation and the enclosures' axis of symmetry is pointed out. They form almost 90° angles.

In Figure 2.2 an unscaled schematic drawing shows the relative sizes and morphology of the six enclosures already excavated as of 2013. Their relative location is identified. Also included in the drawing is the reference number for each of the megaliths included in the six structures' inner and outer rings. The approximate **apparent** orientation of each enclosure is shown, along with the orientation of each megalith. On the orientation of the megaliths some of this paper's findings regarding the role and use of their shadows will be based and discussed in a later section.

Figure 2.3. A rectangular stone enclosure at Gobekli Tepe, with four free standing central T-shaped pillars. It belongs to Layer II structures and it is of course younger then the pseudo-elliptical inner rings (Layer III) structures C and D. The difference in floor plan must indicate a different use, possibly auxiliary to the other enclosures' use(s) and function(s). Very likely this structure was meant to have a wooden roof and the central pillars played the role of load bearing columns. Source of the photo reference [14]:

http://www.thelivingmoon.com/43ancients/02files/Turkey_Gobekli_Tepe_005.html

A structure which in floor plan design doesn't quite fit, given the current narrative regarding the chronology of geometric shapes in the design of structures during the Mesolithic and early Neolithic (see [2]), with the rest of the structures at GT is the one shown in Figure 2.3. This

structure is however especially helpful and a key in calibrating not only GT's initial construction phase, but also better gauge the chronology of some other structures, very closely related to GT, namely Nevali Cori and Catalhoyuk. The construction in Figure 2.3 is a rectangular structure, in which the surrounding dry stonewall does not contain orthostats. Four pillars are located almost symmetrically in the enclosure's interior rectangular space. This single-room structure (it seems to be subterranean from Figure 2.3) must be an auxiliary and subordinate space to the multiplicity of functions carried out by the pseudo-elliptical shaped enclosures C and D (and possibly others still to be excavated). GT was a large in scale site, and it is clear that many spaces were needed and apparently planned for many different land uses.

There are however rectangular in shape structures at both Catalhoyuk (see Figure 2.4), and Nevali Cori (see Figure 2.5). Nevali Cori is thought (erroneously, in this author's view) to be two millennia older than Catalhoyuk. However, architectural construction doesn't seem to support this dating, as their walls' composition and thickness are very different, thus their age also differs but not in the manner conventional Archeology suggests. Catalhoyuk's walls, floors and ceilings are adobe types; whereas Nevali Cori's rectangular shaped temple's stonemasonry walls are almost identical to those of GT – in construction material and thickness and both more advanced at least in durability and quality than Catalhoyuk's construction.

Figure 2.4. Catalhoyuk's rectangular residential structures. This must be considered an earlier construction than Gobekli Tepe's and about contemporaneous to the rectangular shaped Temple at Nevali Cori. Source of photo: https://www.khanacademy.org/humanities/prehistoric-art/neolithic-art/a/atalhyk

Catalhoyuk's tell (tumulus) is of extreme importance in dating both Nevali Cori and GT. Tells (like that at Hisarlik that contains the nine layers of Troy), the ways they form chronicle urban evolution in space-time. The oldest layer is at the core of the tumulus, and newer strata form on top and at its sides, expanding in space over time, both horizontally and vertically. Older strata are usually stripped from their varied and useful furniture (artifacts etc.) that is used in the newer upper and further out strata, in general. The older stratum construction material (in the case of Catalhoyuk, adobe bricks) either disintegrated under either natural or human causes; or it was used for newer construction above it. Otherwise, it performs the role of a foundation for the upper stratum. Thus tells form: inner and lower strata are older than upper and outer strata. Then, tumuli are formed the GT way: buried by human hand, its material never reused, just buried intact and standing. The first way (Catalhoyuk) is **far older** than the second way in forming tells. And this is a strong hint as to their relative chronology, first layer in Catalhoyuk vs. Layer III structures at GT. But there are far more telling signs on relative chronology between the two.

Figure 2.5. Nevali Cori's rectangular Temple. Notice the manner the pillars at the center interior space are supported: they do not use a base, as those of Gobekli Tepe do, and they are anchored inside ground recesses. Similar to Gobekli Tepe is also the floor of the Temple. Benches surround the perimeter wall just as they do at Gobekli Tepe's structures C and D. In addition, noteworthy is the ring to the right in the above photo surrounding the inner Temple space masonry wall, as do the outer ring walls in structures A, B, C and D (see Figure 2.2) at GT. Source of photo: http://rolfgross.dreamhosters.com/Modern-Man-2012/Neolithic/Neolithic.html

The thickness of Nevali Cori and GT's dry stone wall is indicative of far more recent than the thinner stone walls of the Natufian (about the tenth millennium BC) masonry construction, made out of much thicker and bigger stones. Moreover, the rectangular shape temple at Nevali Cori is far later of a shape in the design of either homes or temples, than the arc and almost circular Natufian structures. Thus architectural construction design strongly indicates that Nevali Cori is of a much later date than the Natufian culture and possibly a later construction (at least its Temple date) than Catalhoyuk earliest phase. Furthermore, beyond the specific type of wall in consideration here, Nevali Cori's orthogonal temple structure pushes its construction phase closer to Catalhoyuk's upper layer construction, making it quite younger than Catalhoyuk's bottom layer, and contemporaneous or slightly younger than Catalhoyuk's upper layers.

A note on Catalhoyuk's various layers is in order here. In some layers there, houses' mural artwork is of extreme interest in so far as the interpretations of certain iconography is concerned found on these interior walls. It has been suggested that some depict the urban design and site plans of the settlement, a suggestion proposed by the original excavator of Catalhoyuk which, if correct, would indicate a far more developed and advance settlement than currently thought by the mainstream archeological circles. On this subject, see ref. [19], which disputes this interpretation and suggests that the design is that of a leopard's skin. A predatory animal, possibly a leopard, is also depicted by one of the sculptures in one of GT's monoliths, which will be discussed in a later section of the paper.

Both sites' initial construction is pegged closer to GT's initial (and quite later) construction phase. It is noteworthy that Nevali Cori also contains the interior altar-type or bench lower level perimeter structure that GT also contains, except that at Nevali Cori, the altar (or bench) is capped by flat shaped large in size finer dressed limestone.

Furthermore, see Figures 2.3 and 2.5, the rectangular structures at GT and Nevali Cori clearly indicate some close proximity in their respective construction dates. Due to the apparent auxiliary function of GT's rectangular enclosure, the "GT is a later construction than Nevali Cori" proposition is hard to argue against. However, what mainly makes GT a late Mesolithic building activity is the construction at Jerf El Ahmar, as it was argued in [1], among the numerous other factors mentioned there and here.

In Figure 2.6 the view from the east of structure C is offered where at the upper part of the photo the hill to the west-northwest is pictured. Similar in direction is the, at dusk to nocturnal, view of the structure shown in Figure A1 at the Addendum. A more complete set of GT's topographical features is supplied in the set of photos from Google Earth maps in the Addendum. It seems that the site, where structures A – F were placed, although in a relatively dominant high ground, it was not directly and equally visible from a ground level and from all directions. Structures C and D's unrestricted viewshed was mainly to the southwest and north.

Figure 2.6. Structure C viewed from the East. To the right is structure D. Notice the central pillar's shadow as cast on the ground and onto its companion central pillar. Photo credit and source: http://www.panoramio.com/photo/53380141

The stone enclosures' construction

In this subsection, certain subjects that pertain to the Architecture and Engineering construction detail of the GT enclosures are elaborated. Topics of morphology and design are addressed at length in a later section of the paper. Much construction detail of these monuments is found in reference [7]. Structures A, B and D seem to flank in an arc the western side of structure C, which seems to occupy a central position in the site plan of what has been excavated so far and shown in Figure 2.2. Structures B and C seem to have been designed in the form of roughly concentric rings, forming likely corridors between them, with a mild spiraling flow in their deployment.

The pseudo-elliptical in shape walls of all six enclosures unearthed thus far are made out of unworked partly crashed dry stones. The stone walls are not extended to the top of the enclosures, rising up to various levels below an individual's height. Stonewalls' depth varies, but it is approximately matched by the width of the T-shaped orthostats in them. No mortar was used and neither was any plastering performed on these walls. Plastering was however applied onto the enclosures' megaliths, and it was of some thickness, since carvings, reliefs and friezes of a variety of pictographs and figures was imprinted on them. Apparently, some of these carvings were erased at times and replaced by other motifs.

The stonemasonry enclosing walls were punctuated along usually uneven (but not very much so) intervals by the use of free standing, no load bearing T-shaped orthostats. These one-piece megaliths were directly set on the enclosure's ground or in limited instances they were elevated slightly above ground and settled on the dry masonry walls' specially formed stepped up recesses. Not all megaliths have the same height. Those embedded in the wall (the orthostats) are always lower in height than those two T-shaped megalithic pillars which dominate the stone enclosures located at center stage of the pseudo-elliptical structure. The central pillars height varies between three and six meters. Even the two T-shaped pillars at the center do not have identical heights, one seems to play a dominant role over the other and certainly in reference to the wall's orthostats.

At structure C, the two central pillars sit on an individual base, a type of broad pedestal, and the size of these bases are significant in reference to the entire floor area of the monument. The bases' length is about twice the pillar's length, while its width is about five times the pillars' thickness. Bases are carved from the ground's bedrock. The pillars although they get some partial support from the base, they must be anchored into the ground.

Figure 2.7. Orientation of the four pairs of pillars from structures A, B, C, and D at Gobekli Tepe. Schematic drawing by the author over an aerial photo. See also the section on the morphology of structures C and D and Figure 6 for more on the issue of orientation of these two structures. Source of photo ref. [6].

All unearthed thus far orthostats seem to have an orientation in the general direction towards the enclosure's center space, but they are not always and exactly oriented towards some centrally fixed point. It seems that the architect wanted to have **different shading conditions on them, as well as orientation**. The two central pillars of all enclosures seem to be oriented in a manner generally parallel to the enclosure's **apparent** overall orientation, as shown in Figure 2.2, but not exactly so. As we shall see in the section on the structures C and D's detailed morphology, this isn't the intended orientation of either structure C or D; the **real orientation** of structure C is

towards the summer solstice rising sun, and so is the approximate real orientation (axis of symmetry) for structure D.

Looking carefully at the two central pillars for all enclosures reveals that the two T-shaped megaliths do never run exactly parallel to each other and they do not align exactly as to be level on their narrow sides – they are set as if one pillar "follows" slightly yet discretely the other. There doesn't seem to be a consistent apparent orientation of the enclosures, as Figure 2.2 indicates when entrances are taken as indications of "orientation".

A non-discernible pattern in the orientation of the central pillars is also shown in Figure 2.7. However, azimuths need to be estimated with some accuracy for each structure's pillars, particularly the two largest, C and D's central pillars, to be exactly calibrated. Given the elapsed time period and the motion of the Earth's axis of rotation in its 26000-year cycle, allowance must be made since the current azimuths do not reflect precisely the then orientation of these structures, although according to the Thom's in [10] this change in Earth's ecliptic isn't very significant. In a later section on the Architecture of the structures' floor plan, a different sense of orientation and symmetry in structures C and D in specific will be revealed.

As this paper is not dealing with symbolism per se, any interpretation that can be drawn from these stones' layout, relative sizes, orientations etc., is left to the interested reader. Obviously, symbolism is attached also to the number of monoliths embedded in each structure, beyond the possibly male/female (deity/ancestral) dichotomy depicted by the two central pillars.

There are five megaliths in structure A; nine in structure B; 21 in structure C, the inner ring containing eleven plus the two at center, while the outer ring contains eight; and fourteen in D. All of these 49 megaliths are numbered in Figure 2.2. In addition, there are four non-numbered megaliths, two in each of the structures E and F. In total, so far these have been the 49 uncovered megaliths. There could be more, as spaces seem to have been made to accommodate more megaliths in structure C. And of course, more monolithic megaliths may be still in the ground, waiting excavation.

The most well and regularly spaced megaliths embedded in the stonemasonry wall are those of structure D. Whether this has any special meaning is not clear. The fact that the orthostats at structure D number twelve could possibly indicate some hexadecimal system in place (possibly a clock related function). If the space between stones #13 and #24 in structure C was to place a twelfth orthostat there, then that would imply some inter-connected calendar type purposeful function for both C and D. The hexadecimal system is encountered in the Neolithic, see [2] for more discussion and references on that subject. Their difference in the state of preservation might indicate some difference and intent in their burial; see for more on this the last section.

Their floor, set on bedrock, was coated by an archetypal type cement like material quite similar to terrazzo (burnt lime). This is the type of floor we encounter in the case of Nevali Cori as well. Some of the pictographs have been erased [7] and some of the T-shaped pillars have been

broken, or had their head chipped or chopped off. Some of the orthostats have been displaced or missing. See for instance the two pillars of structure C in Figure 2.3. All pillars and orthostats are from locally (and close-by) quarried limestone.

Limestone is easily shaped, far easier then basalt granite or marble, although not as durable and so it presents a good tradeoff to architects, especially in the Mesolithic when the tools to work stone were harder stone not metal. Thus, limestone became a stone of choice for large scale construction in the Mesolithic, a suitable material to work with in building the megalithic structures at GT, as it was at Nevali Cori. But GT and Nevali Cori differ significantly in a major aspect: Nevali Cori is a single nucleus structure, whereas GT is a multi-nucleated set of structures – a maze of structures, some large some smaller in size, far more complex in site design, thus younger than Nevali Cori. In that multi-nucleated pseudo-elliptical set of structures, GT resembles the site plan of Jerf El Ahmar. But it is far more developed and complex than Jerf El Ahmar in design, thus younger than Jerf El Ahmar. This is the central element of the argument regarding GT's dating, based on the Architecture of the monument. For the site plans of both Nevali Cori and Jerf El Ahmar see [1].

There is the floor plan rectangular issue: at Nevali Cori (as is the case also with Catalhoyuk) we encounter rectangles, a pure geometric shape which is not supposed to be there at the Mesolithic. One can address the Catalhoyuk case as a matter of distance: being 330 miles away, this innovation in design of residential construction might have been an independently derived innovation. But this isn't the case with Nevali Cori – same region as GT only 30 miles away.

In fact this is an anomaly in the evolution of design. From circular and apse/arc type structures of the Mesolithic to the pseudo-elliptical structures of GT is a straightforward linear transition. Rectangles were still ahead, a few centuries possibly a millennium downstream from Upper Mesopotamia's GT in Lower Mesopotamia and Uruk. What was a rectangle temple doing at Nevali Cori two to three millennia too early? One must consider this as a flash in the pan type innovation, a new design that was far ahead of its time. It is the only component of the historiographic scenario that doesn't quite fit. Or, alternatively, the dating of Nevali Cori (and Catalhoyuk) is far too off the mark, and instead it is much closer to a 6^{th} millennium BC GT.

It is worth noticing that the orientation of the central T-shaped pair of megaliths in all four structures (A, B, C, and D), see Figure 2.7, follow in general a direction from the northwest towards the southeast, they do not seem to align either inter-structurally (among structures) or intra-structurally (within a structure), with the possible exception of the pair of monoliths in structure A (pillars A1 and A2 – from Figure 2.2, it is pillars #1 and #2). From an inter-structure viewpoint, pillar C2 from structure C seems to align with pillar B2 of structure B (these are pillar numbers #35 and #9 in Figure 2.2). Whether this was by design, or just an unintended consequence remains an open question. However, these orientations will be revisited in the section of the paper where the role of the monoliths' shadows in these structures will be explored more fully.

On the artifacts and their dating

Because artifacts of an older period have been located inside the various layers of GT's structures, it doesn't necessarily follow that they are of GT's age, or that GT is of their age. Fills do not date a monument, so whatever is contained in that fill (including artwork) doesn't put a date on the structure. If an artifact in that fill is securely dated, then this is a *terminus post quem* for the fill (but not the structure), i.e., the fill could not have been of an earlier date than the artifact was made. However, the filling by dirt containing this artifact could have taken place later.

Figure 3.1. The salamander; a GT related artifact-relief embedded on a roughly cut T-shaped stone. Obviously, the salamander is carved so that a human face is abstractly detectable in the petroglyph. In many other renditions of animals and other symbols this "ambivalence" in imagery is apparent at GT. An approximate symmetry in the salamander rendition is also noted. Symmetry is not a characteristic of Mesolithic Art. Furthermore, noted is the fact that this relief is not carved on the pillar's plaster coating (there isn't any coating here), but directly on the limestone core. This salamander should be contrasted with the "predator" (possibly a leopard) sculpture on the narrow side of the perfectly rectangular T-shaped orthostat #27, at the inner (Layer III) ring of structure C. It is much older than the #27 art form.

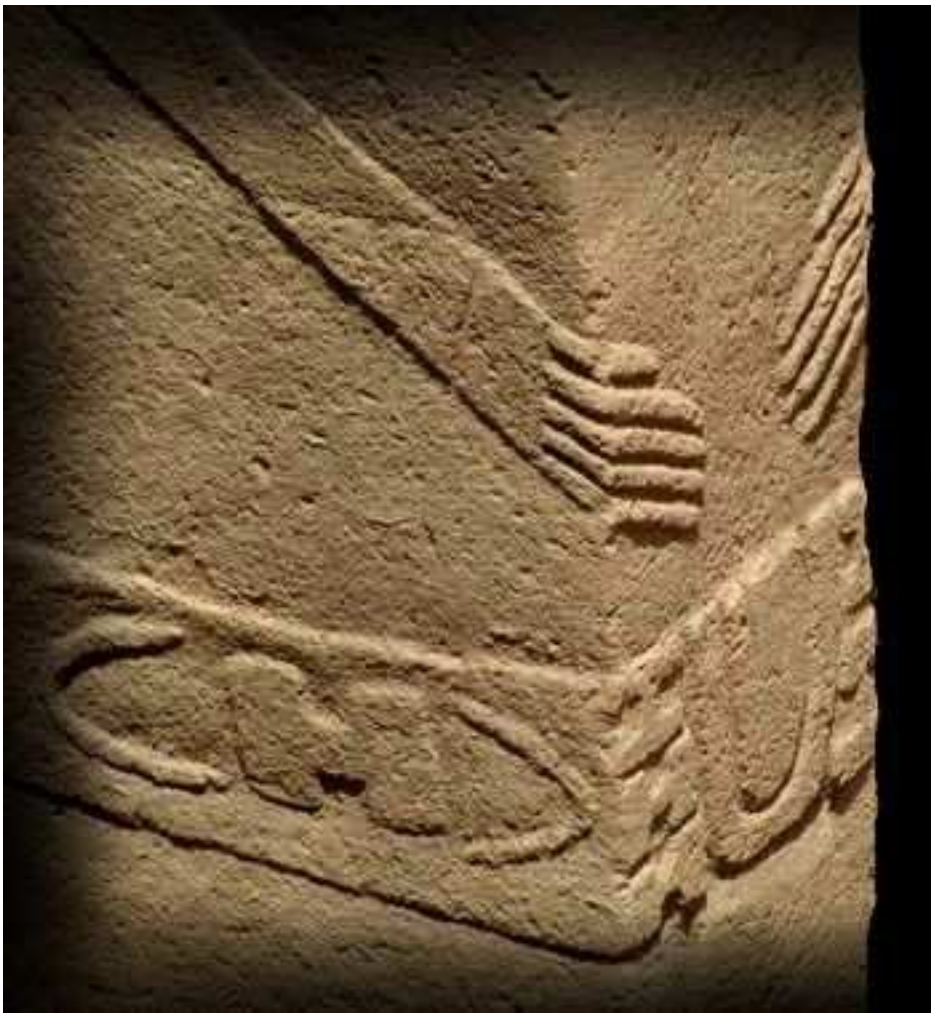

Figure 3.2. The perfect symmetry megalith. Reliefs on a Gobekli Tepe rectangular megalith containing on both sides the same symbols in perfect symmetry and reverse roles. On the long side, the symmetric symbol "H" is carved, symmetrically flanked by two apses. On the frontal narrow side, the roles are reversed, as a set of five H's (two vertically and one horizontally positioned at the left hand side, two horizontally positioned at the right hand side margins) flank a set of male/female apses facing up. The pair of hands are symmetrically placed and so are their fingers. The exquisitely fine outline and shape of the hand's fingers and the rest of the symbols is unseen even in late Neolithic Art; noticeable is the undifferentiated length of the fingers on each hand, with the exception of the thumb. The degree of sophistication, symbolism, quality of work, symmetry and dexterity are extraordinary. The relief is carved on the stone's coating.

What is of interest is that the artwork associated with GT, be that on its pillars and orthostats, or of the fill used to bury the structure are of very different artistic vein and of vastly different time periods. In [1] the author extensively discussed the art content of GT, and specifically certain of

its pictographs associated with the purification symbols at the top of the T-shaped orthostat #43 of structure D, see Figure 2.2. Here the analysis expands on those points raised in [1].

An example of a very early Mesolithic type artifact is that of Figure 3.1 depicting the very rough form of a salamander. One is struck by the very rough working on both the limestone it was carved and the figure itself. In contrast to this older salamander depicting petroglyph is the fine carving on the orthostat, and possibly the **iconic pillar of GT** that portrays a human embrace of the stone. The relief depicts a finely carved pair of hands and their ten fingers, as well as the perfectly symmetric symbol "H" and an apse on the side and the set of symbols at the narrow front of the megalith with the apse again being a dominant element of the composition, Figure 3.2. Not only the specific symbols carved on both the front and sides of the orthostat are processed in much detail and very carefully worked, but the framing of these representations is of note. This is obviously a Neolithic era petroglyph of a very refined quality, an artifact belonging to a different era than the salamander of Figure 3.1. Since the glyphs were periodically erased and re-carved, it is possible that not all sculptured figures are contemporaneous with the initial construction phase at either the enclosures they are found in or GT's first stone enclosure. As the functioning of GT as a ceremonial site (among its many other uses we suggest here) lasted for well over two millennia, evolutionary changes in artwork styles and the culture itself may have accounted for the various art pieces and their school of Art they belong and imprinted in these megaliths.

In Figure 3.3 another artifact (a perfectly rectangular cistern, or a libation container - vessel) found in the fill's lower strata of enclosure B is shown. It was found broken into two pieces (see Figure 4.3). The cistern's design and fine cut out of limestone is another strong indication that the filling with soil and burying of the monument occurred in a Neolithic time period.

Figure 3.3. A rectangular cistern (libation container) found at the fill of structure B. See also Figures 4.3 and 4.4 at the end of the next section of the paper regarding this container.

The shape and dressing of the megaliths

The processing, carvings, and dressing with stucco or plaster type cover the stones and pillars at GT is of a date and type not encountered until late into Neolithic, at the Hagar Qim phase Temples of the Maltese Archipelago, early 4th millennium BC. One of the most astonishing features of GT's Architecture is the fine processing of the megaliths, be either those of the central T-shaped pillars or the T-shaped orthostats embedded in the enclosures' masonry walls. Part of that fine processing is their almost perfect rectangular shape. Rectangular shape orthostats we also encounter in the case of Nevali Cori. However, it is not of the very refined stage of GT – this being another feature attesting to the succession regarding initial phase being built: Nevali Cori first, followed by GT.

Rectangular orthostats and pillars we encounter much later at the Hagar Qim Temples of Malta. It seems that GT strongly influenced the Maltese Architecture and Art, and that influence must had been recent, when the GT site was just buried. Otherwise, its legacy would had died with it, forgotten and lost to collective memory. Unless the influences emanating from it and reaching Malta at the time of Hagar Qim's initial construction phase were recent.

The dressing of the pillars and orthostats was made from pedogenic carbonate coatings, see [7]; this is a form of plaster. Although the practice of plastering walls is a phenomenon common and quite older than GT in the Architecture of Mesopotamia, the plastering of free standing stones is unheard of and unseen at any PPNA/B site, anywhere in Eurasia. This component of the GT structures is a contributing factor in dating the monument significantly post PPNA/B.

One of the impressive (although not uncommon in stone carvings of the Mesolithic in Eurasia) features that some of the GT's coated megaliths sport is the round recesses at their top. Undoubtedly, these recesses were made to hold some flammable liquid, possibly olive oil, to light them up at night during ceremonies.

Another critical component of GT's Architecture is the coating of the structures' floor with a form of cement, terrazzo (burnt lime). This is also encountered in Nevali Cori's temple floor; otherwise, the practice is unheard of for the early Mesolithic. It is met at the 6th millennium BC Danube residential site of Lepenski Vir, see for more on this [2].

Dressing of stones is encountered in isolated cases in the Neolithic by Babylonians and Assyrians and later by Egyptians who used calcium carbonate to make mortar with gypsum [8]. The issue of contamination from the fill of the pillars and orthostats' surface was addressed in [1]. Carbon-14 analysis of the stones' plaster coverage was found to be for enclosure C's Layer III from the 7560 – 7370 BC period, whereas for the enclosure B (a much more primitive form than the C structure) from the 8280 – 7970 BC period. The argument of this paper is that the key enclosure C dating is off by about two millennia. In summary, the Art and Architecture as well as Urban Design aspects of the GT site supply very strong evidence that these are very late Mesolithic to early Neolithic structures. We now turn to their Architecture and Design proper and their context.

An overview of structures C and D

Figure 4.1. Aerial view of Gobekli Tepe's six structures; for orientation of the central pillars of all four structures (A, B, C, and D) see also Figure 2.7. North is up. Photo credit Nick Becker, German Archeological Institute. Source of photo: [6].

In Figures 4.1 and 4.2 the floor plan can be seen (the author has no access to the architectural drawings of these enclosures, if such drawings exist). Thus all references to a floor plan for the two structures, especially structures C and D that will preoccupy our analysis here, come from approximate dimensions and aerial photos available on the internet or the various publications about GT cited here. In any case, since much of the discussion utilizes modular lengths (which are based on ratios) the difficulty emanating from a lack of exact architectural drawings is largely bypassed. A strong feature, especially in structure C's floor plan, but also a feature encountered in structures A, B, and C, is the outer rings. Obviously, they were walkways and also features of isolation and insulation of the core central stone enclosure. Some of them have benches, some create wider spaces, places where individuals could stand or sit between raised orthostats there.

Figure 4.2. Gobekli Tepe close up aerial photo of structure C. Notable is the eccentric location of both central T-shaped pillars in reference to their base and to each other. The **real** orientation and **axis of symmetry** of this structure is towards the northeast, possibly towards the rising sun at the summer solstice. Then the shadow from the pillar to the right falls on the pillar to the left. This also occurs at sunset during winter solstice, when the roles are reversed. It is suggested in the paper that shadows played a significant role in the positioning of the orthostats and pillars in all structures. Beyond male-female allegory in these two megaliths' alignments involving their shadows within the enclosure, shadows likely played a major choreographic role in the design of the entire structure(s) and the positioning of megaliths in them at Gobekli Tepe. That role potentially included the determination of time during the day, so that the enclosure acquired the form of a complex sundial. Notable is the differentiation in use of the enclosure's space: the northeastern section must have involved a far more complex function than the rest of the enclosure's space. North is straight up in the photo. Source of photo [23].

From Figure 4.1, the structure D can be seen as having a clear “egg” shape, “egg” being a term coined by Alexander Thom, to whose work we shall go in the following section. The shape of structure C (the dominant structure in the set of six enclosures shown in Figure 4.1) will be the subject of a section following that in which we review the father and son Thom’s classification of enclosures of qualitatively similar form. In short, structure D is a slightly older structure than C, maybe constructed before C became part of the complex. However, one can hardly talk about “phases” separated by a significant time period, as the two structures bear strong similarities.

Figure 4.3 Structure B’s interior during excavation. The broken into two pieces cistern (possibly a libation vessel) is shown as found in the lower strata of the fill. The scale of the monument can be directly gauged from this photo. The structure’s smallest net (benches not counted) interior space is about as wide as twice the length of the average pillar, a very human scale indeed. Notable is the fact that the megaliths here bear no relief motifs. Source of photo [14].

Outer rings as integral parts of these structures, played a role far more complex than simply supportive and auxiliary, acting as just corridors. These sections of the structures could be

covered, if indeed the central ring stone enclosures were meant to be an open air structures. This will be further explored in a bit. In Figures 4.1 and 4.2 the floor plan can be seen (the author has no access to the architectural drawings of these enclosures, if such detailed drawings exist). Thus all references to a floor plan for the two structures, especially structure C that will preoccupy our analysis here, comes from the aerial photos available on the internet or the various publications about GT cited here.

Figure 4.4. A similar cistern to that of Figure 4.3 is shown here, at the lower strata of fill in Layer III at Gobekli Tepe. This is in design detail a much rougher cut in limestone than the one in Figure 4.3, thus older. However, the double rectangle shape and varied functionality of the libation vessel (implying some differentiation in content and purpose between the two rectangles) as well as the detailed artwork for the four animal figures at left renders it post middle Mesolithic (i.e., later than 7000 BC.) it may suggest a period of more affluence in the community that maintained the structure at the time the cistern was made and used, than that of the period the cistern in Figure 4.3 was made and used, although their dates of make could be (possibly totally) unrelated to the construction date of the two structures. The cistern above also acts as a *terminus post quem* on the cistern of Figure 4.3. Since both were dropped inside these enclosures by the end of the site's use, although they can't be of any use in dating the structures, they are informative regarding the dating of the fills.

From Figure 4.1, structures C and D can be seen as having a clear “egg” type pseudo-elliptical shape, “egg” being a term coined by Alexander Thom, to whose work we shall go in the following section. The shape structures C and D (the dominant structures in the set of six enclosures shown in Figure 4.1) will be the subject of a section following that in which we review the father and son Thom’s classification.

In short, Architecture confirms that structure D is an older structure than C, due to C’s higher complexity in design than C’s floor plan. Very likely D was constructed before C was part of the complex. One can hardly talk about distinct “phases” yet among structures, construction and styles, separated by a significant time period, as much is still in the ground waiting excavation.

Alexander Thom's typology of stone enclosures

Alexander Thom and his son Archibald S. Thom in a classical by now work on megalithic monuments of the British Isles and Brittany, France tried to deconstruct their Neolithic stone circles and also petroglyphic ring circles. They attempted to de-compose these approximate circles (actually, these monuments have shapes far more complicated than simple circles) into their constituent parts. As a consequence of this effort, they came up with a scheme of classifying these forms, a scheme of some use here to deconstruct GT's structures, especially enclosures C and D. Analyzing this classification is the focus of this section of the paper.

In [10] chapter 3, Alexander Thom's classification is offered of stone circles, and also what he refers to as "ring circles", in effect petroglyphs which bear circular or elliptical or spiral motifs, iconography or pictographs on them. Thom's insightful analysis is of interest here. It is captured in his diagrams of p.18 in [10]. We shall disregard the argument by the Thom's as to the unit length basis of these circles and rings. The father and son Thom argue that the modulus is their "megalithic rod" (two times their "megalithic yard", a length equal to about .83 meters) in the construction of the stone circles (enclosures/monuments) of all the megalithic sites (which include Neolithic and Bronze Age Architecture and construction) in Brittany as well as all the British Isles (including Ireland and the Orkney Archipelago). They do not employ the term "modulus" (they are not architects) but that's what in effect they imply.

Their claim, that the "megalithic rod" was used in Brittany's Carnac monuments has been in part refuted by the author in [2] and [3], based on evidence from the monuments of Le Grand Menec and Crucuno, at Carnac. Nonetheless, their analysis of the "egg" shaped stone enclosures is very important and useful here, since the stone enclosures referred to as "structures C and D" at Gobekli Tepe do exhibit similar shapes to those analyzed by the father and son Thom.

The Thom's call these shapes "egg" shaped structures or "flattened circles", and they consider them (correctly so) intermediate shapes between pure circles and ellipses. They classify them according to the complexity the shapes exhibit in their design. Complexity is measured by two factors: first, the minimum number of arcs the "flattened circle" or the "egg" structure can be broken down, thus the number of circles required to (approximately, i.e., to an acceptable degree) trace all arcs and complete the enclosures' circumference; and second, the position of the circles' centers within these shapes and the computing of their radius. The Thom's also find some (weak) relationships (ratios) linking all these circles' radii. Their efforts centered on showing that these ratios involve integer numbers (incorrectly so, since in many instances these ratios produce rational fractions or even irrational numbers). It should be mentioned that accuracy in measuring even *in situ* the exact lengths of these circles' radii, diameters or circumferences at times leaves a lot to be desired.

All cases analyzed by the Thom's involve stone circles that exhibit two fundamental features in their morphology: first, **at least half of the enclosure consists of a single circle**, whereas the

remainder of the circumference is a composite of an odd number of arcs (thus they contain, counting the initial half circle, always an even number of arcs *in toto*); second, the enclosure is **perfectly symmetric** along an axis which bisects the part of the enclosure that contains the semicircle, this being the orientation of the enclosure.

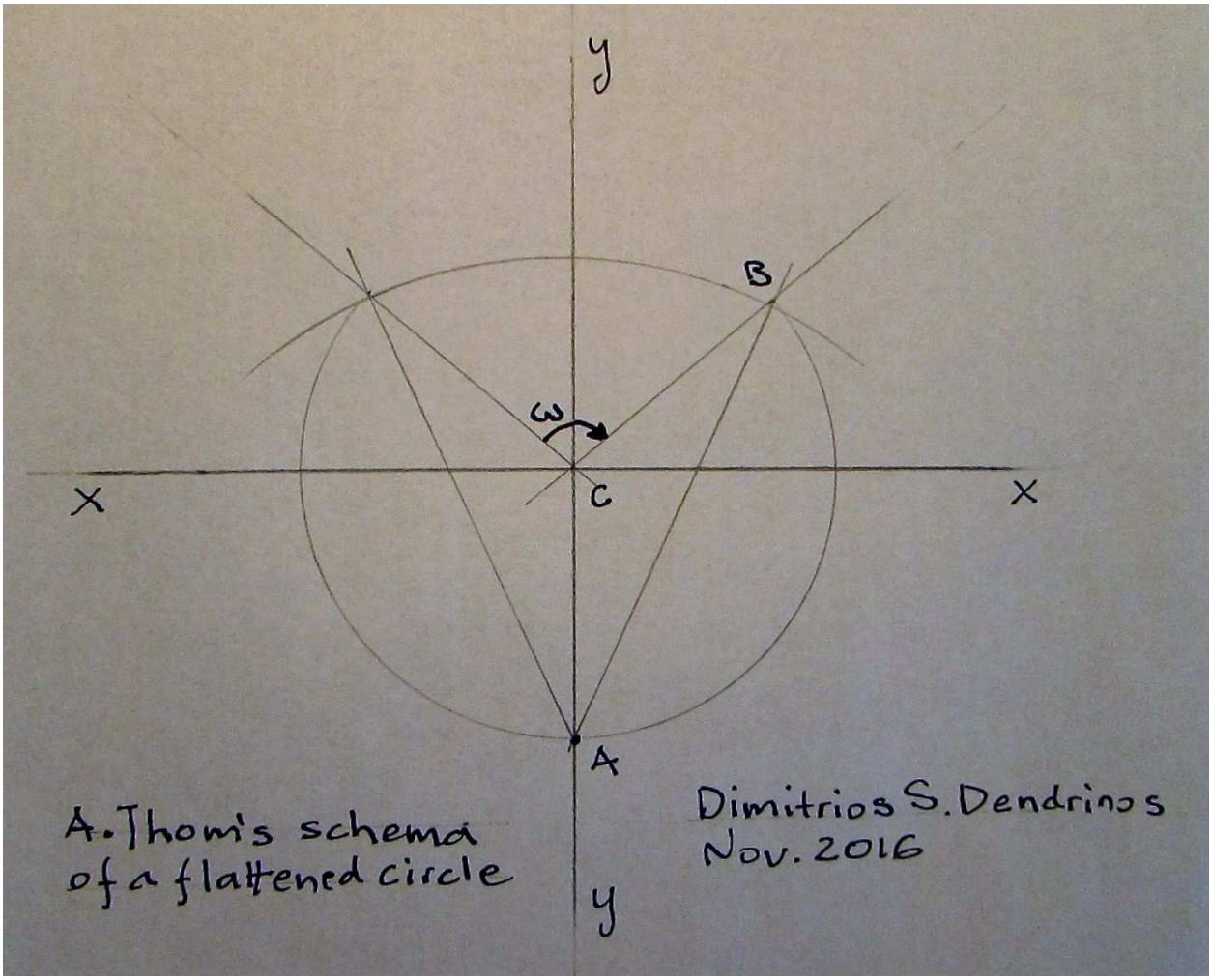

Figure X. Alexander and Archibald S. Thom symmetric (indicative of the enclosure's orientation) along the **yy**-axis schema of a flattened circle, according to reference [10]. Drawing by the author.

Here are the eight types found in the Thom's analysis, p. 18 in [10]. In principle, their underlying design schema is quite simple. Seven cases (out of eight, the eighth case being simply an ellipse) involve drawing multiple circles. Four of these cases have (in part) circles drawn as in Figure X, that is, by drawing two circles. A smaller radius circle is drawn first, tracing the bulk of the perimeter with center at C and radius (CA). It leaves space of some angle ω to be traced by an arc

from a second circle. This longest-radius (AB) circle has as its center the point where the symmetry axis (**yy**) of the entire enclosure (being also its orientation) intersects the main circle (with center at C) of the enclosure at A. The rest of the cases involve arcs which are drawn from circles with a radius and a center derived through some simple algebraic formula specific to each case. It should be noted that at the points of intersection of two arcs from different circles, the perimeter undergoes a discontinuity, since the two joining curves at that point do not share the same tangent.

The eight specific cases suggested by the Thom's are as follows: (i) **Flattened circle type A** (a 4-circle case); the shape involves a 240° arc of a circle, the rest of the enclosure's perimeter (120°) are traced by a pair of small circles' arcs (part of circles with a radius determined by an algebraic expression) and an arc of a large circle with radius equal to the distance between the intersection of the symmetry axis with the 240° circle and the end of the small circle's arcs, for an arc of 30°. (ii) **Flattened circle type B** (a 4-circle case); the shape involves a semicircle, flanked by a pair of 70° arcs with small radius (determined by an algebraic expression) a third of the semicircle's diameter, cupped by the (approximately 35°) arc of a circle with a long radius equal to the distance between the point of the semicircle's intersection with the symmetry axis and the end point of the small circle's arc. (iii) **Flattened circle type C** (a 4-circle case) qualitatively similar to the case in A, except that the long radius forms a 20° arc. (iv) **Flattened circle modified type B** (a 4-circle case); the small radius is a quarter of the semicircle's diameter, and the arc of the long radius' circle is about 50°. (v) **Egg shaped circle type I** (a 4-circle case); it consists of a semi-circle, a pair of arcs drawn by two equal in length long radii, their centers' position on the semi-circles' diameter (split approximately in thirds), each forming an approximate 50° angle, the rest of the enclosure's perimeter is formed by an arc of a small radius about half the length of the two long radii. (vi) **Egg shaped circle type II** (a 2-circle case plus two linear segments); the shape consists of two different arcs and two equal linear segments parts of two squares. The major feature is an approximately 280° arc of a circle, two linear segments of length determined by the long side of a triangle which the Thom's categorize as a 3:4:5 right triangle with its hypotenuse on the symmetry axis, and an approximately 100° arc of a circle with a radius equal to the linear segments. (vii**) Egg shaped circle with semielliptical end, type III** (a 3-circle type plus an ellipse); this type involves half of an ellipse cut in half at its major axis, flanked by two 20° arcs of circles with centers at the half-ellipse's ends and long radii equal to the half-ellipse's major axis, cupped by an approximately 140° arc of a circle, with center at the point where the two long radii intersect the symmetry axis of the enclosure. (viii) **Ellipse** (a single type form stone enclosure).

The "flattened circle" types have always their long circles' radii on the perimeter; whereas the "egg" shaped circles have a more complex structure, and their formation requires a more involved process than the simpler "flatted circle" cases. The author in [2] suggested that there is an **evolutionary aspect** to these schemes, whereby simpler cases must have preceded more complex cases. Such a "complexity index" could be used as a marker to determine dating of these

stone circles (enclosures, cromlechs) or ring circles (in petroglyphs). In general, “flattened circles” (being simpler in form) must predate “egg” shaped enclosures, a hypothesis which is subject to statistical testing, if specific dates are known for these enclosures/rings from their archeological matrix.

What is of interest also here is that the stone enclosure at the western end of Le Grand Menec at Carnac, Brittany, France (a monument with a starting phase circa 4500 BC) is a (v) case enclosure, i.e., an “egg” shape circle type I (according to Alexander Thom and his son A. S. Thom) [10] chapter 6. It turns out that the “egg” shape enclosure C, at GT, is also a variation of an “egg” type enclosure of far greater complexity. Whereas the older structure D has a simpler pseudo-elliptical shape. This is a major factor why the dating of GT must be considered relatively close to the dating of the early phases at Le Menec, Carnac, Brittany, France. Given the above brief review of the Thom stone enclosures’ forms, we turn to examining the GT, structures C and D stone enclosure’s morphology. The reader is also referred to [2] for more on the Thom’s work.

Structures C and D morphological details

Having reviewed the Thom’s classification of stone circles, the analysis now switches first to structure C of GT’s set of monuments. In Figure 5.1 the deconstructed design structure of the enclosure’s morphology is shown. We are addressing the interior circumference, i.e., the structure’s inner ring (Layer III) disregarding the shape of the benches. The outline of the structure’s exterior surface (the exterior of the dry masonry wall) is very irregular in both thickness and outline, thus it is next to impossible (given the available resolution) to draw any firm conclusions regarding its structure’s form. An interior altar or bench runs the perimeter of the wall, at a level of about a meter. Its outline closely follows the interior circumference of the enclosure. We do not include the width of the benches (or possibly altars, or whatever other use the masonry step next to the enclosure in the structure’s interior may have been).

Following the Thom procedure, the **minimum number** of arcs (in effect, circles) into which the structure can exactly (that is, at an excellent level of approximation) be de-composed is discovered: **four.** Although the exact size of the stone enclosure in meters is unknown, it ranges between seven and ten meters, the discussion regarding dimensions of the scheme below and its various components is in modular units.

The western section of the enclosure’s perimeter is a circle with a radius three modular units (about three to four meters). Its center is at point C, see Figure 5.1. This circle offers an almost 180° arc (section AB, almost a semicircle) in its contribution to tracing the interior circumference of the structure. Next in size is a circle drawn with a center at point K and of radius KE, of 2.5

modular units, contributing an arc of about 60°, arc (DE). Between points A and E on the interior circumference of the stone wall, an arc is added (EF) by drawing a circle with center at point L, and a radius of 5.8 modular units. It is noted that the two orthostats marking the southern-eastern entrance to the structure define a section of the perimeter which is not included in the circumference's trace through arcs, since it is no part of the masonry wall. The fourth and final section of the enclosure is an arc (BD) traced by a circle with the longest radius, ten modular units, and its center is at point M.

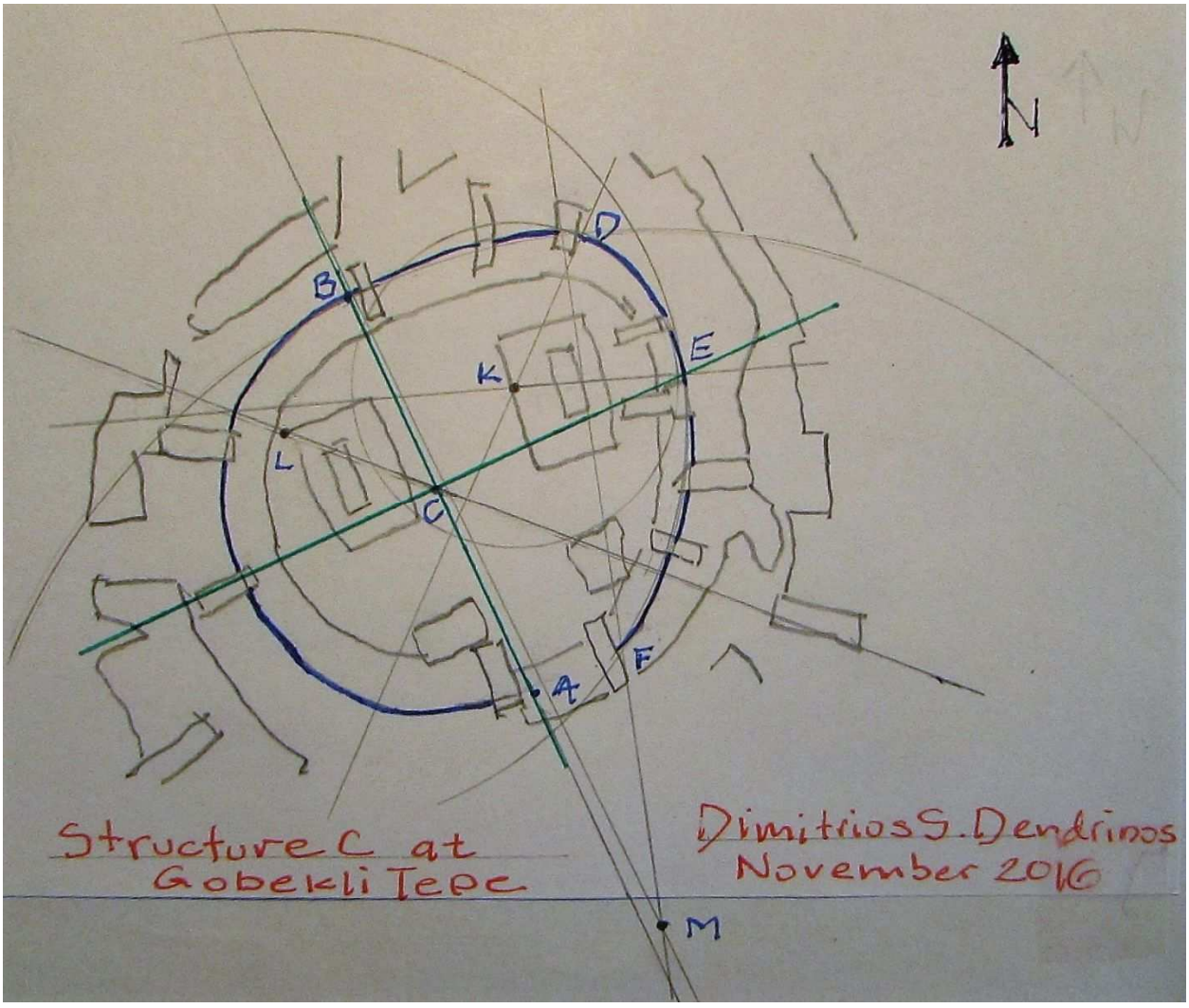

Figure 5.1. Deconstructing structure C, and discovering its constituent elements. Structure C's floor plan, inner circle, interior stone wall's perimeter (not inclusive of the bench or the outer rings) are shown. The axis of approximate symmetry CE is found to possess a southwest-northeast direction, at an approximate azimuth of 65°. Recesses in the outer rings' stone walls indicate spaces of floor usage beyond walkways. Drawing by the author from aerial photo in [23].

A number of observations can be made, and some conclusions drawn from this morphological decomposition of structure C's Architecture and the discovery of its constituent elements.

First, the **real orientation** of the monument is along the axis of approximate symmetry of the half circle with center C, and arc (AB). This axis, line CE, has a southwestern to northeastern direction and an azimuth of about 65°, possibly coinciding with the then sunrise during summer solstice.

Second, the radii (in modular units) of the four constituent circles (2.5, 3, 5.8, 10), beyond any regularity they may entail, reveal that the structure's floor plan's eastern section was not as simple (it required three arcs from three circles to trace) as the single semicircle form of the western part. This **asymmetry** is noted as it seems to imply that the intent by the architect was to emphasize the **duality** of the two sections (eastern and western) of the structure.

Third, there are some **alignments** of note. The locations of the two centers (K, L) required to trace the eastern section of the circumference fall exactly at the edges of the two central T-shaped pillars' bases. The third center (M) falls almost on the AB diameter of the main circle (outlining the western section of the enclosure). The fact that it doesn't exactly fall on the AB line is a matter of slight construction imperfections (normal for any, not just this, structure). Moreover, there are certain alignments and some ratios of interest. The centers K and L are on an alignment with point E on the perimeter, as are points C, K, and D. In proportions, two **key ratios** are approximately equal: (LK)/(KE)=((AM)/(AC). Furthermore, points D, F, and M are in alignment. In addition, line CL bisects the 90° angle formed by the monument's axis of symmetry (CE) and the diagonal AB).

Fourth, line LC has an orientation close to the sunrise rays during winter solstice. Pending more exact determination of its azimuth, orientation of line CL may be the sunset rays of the summer solstice.

Fifth, and in summary, the overall form of the enclosure can be characterized as a complex pseudo-elliptical type structure, at par with the most complex "egg" shape stone circle of the Thom's analysis. This is another indication that this is a rather recent (in Neolithic terms) construction, definitely not much older than the 5000 BC date. The closest type, of the eight types analyzed in the previous section, to this structure is Alexander Thom **type (v)**, the same type that is descriptive of the "egg" shaped stone enclosure at Le Menec's western end, at Carnac (with a 4500 BC initial construction date). See [2] for more on this enclosure.

One must ask here in the case of structure C's morphology, as one must ask the same question in the case of any Neolithic monument bearing such an unusual not geometrically pure (like for example, triangle, circle, rectangle, etc.) shape: was this form drawn by design, or is it simply a randomly drawn, out of local in space-time utility and not by design form. The fact that these forms (in some variety of course) appear in a wide Region (from the Middle East to Western Europe) and over a wide range of dates (late Mesolithic, through Neolithic, and even during the Bronze Age), i.e., it is a form which demonstrates spatial and temporal durability, it must lead

one to the conclusion that it was **intentional**. The author prefers to use the term "pseudo-elliptical" rather than "quasi-elliptical" because the latter implies an effort to approximate an ellipse, while the notion of an ellipse was very far from Mesolithic and Neolithic designs tools.

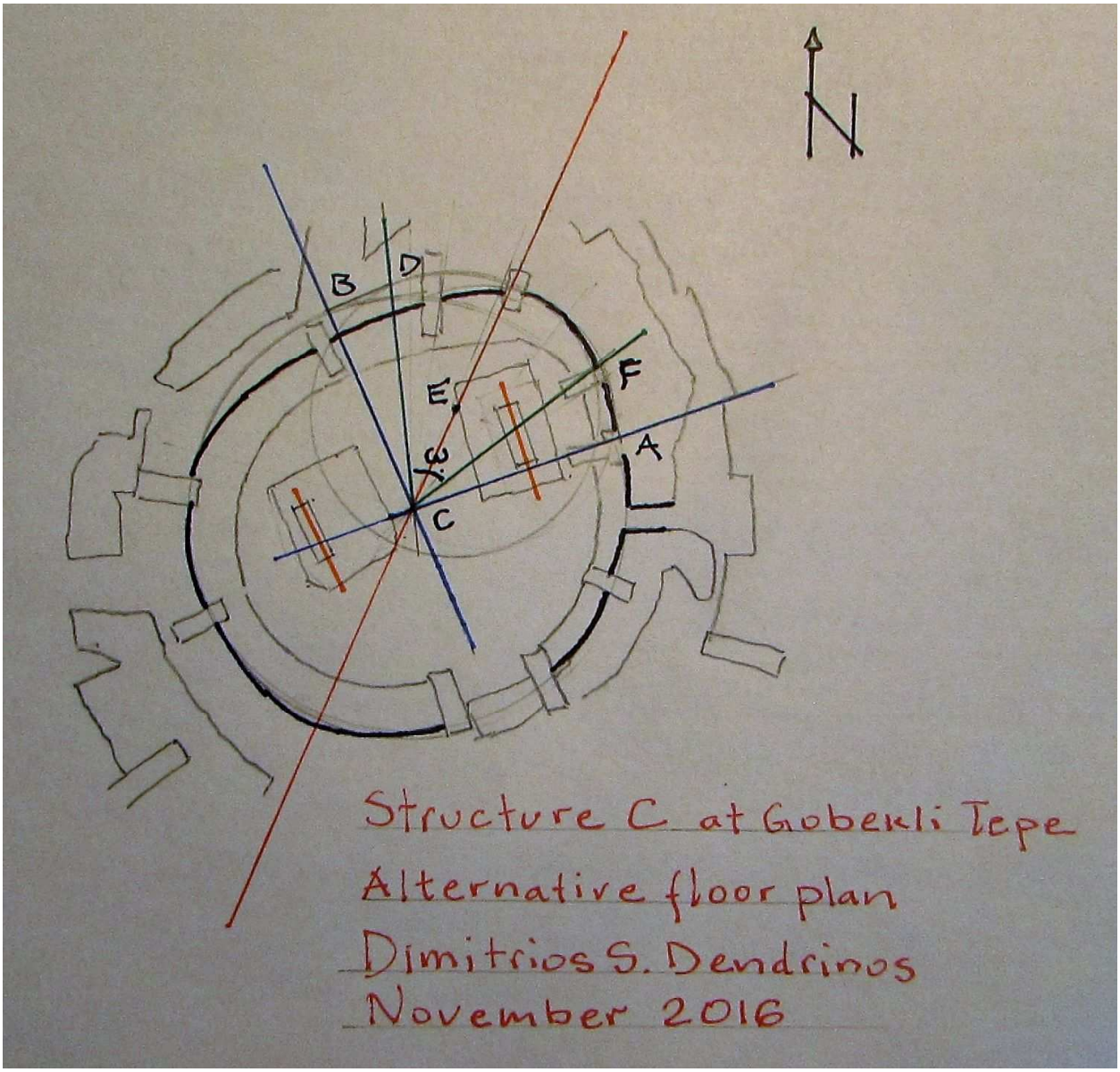

Figure 5.2. Gobekli Tepe structure C, alternative floor plan: perfect symmetry along the red line, but under a very rough approximation (notice the northwestern section of the enclosure). Drawing by the author.

This pseudo-elliptical morphology must have had some deep roots in religion, custom, culture, society, and economics. To become a stable and strong architectonic feature of major megalithic

monuments, it must have had some very **strong symbolic meaning** in it. It can't be just thought of and dismissed as a failed or primordial attempt to draw either circles or ellipses (the quasi-elliptical notion). The pseudo-elliptical morphology of structures C and D at GT, along with all other similar structures in Brittany and the British isles, became a fundamental design tool in late Mesolithic and especially during the Neolithic.

Although GT was not the first place where this pseudo-elliptical form appeared (Jerf El Ahmar was), GT must have been the place it was launched from and **spread out** on its way to Europe.

A lower approximation, but also with a lower number of circles scheme and an exact symmetry in replicating structure C's morphology is shown in the alternative floor plan of Figure 5.2. Now, an approximately 270° arc from a circle with center C and radius 3.5 modular units traces almost three quarters of the entire interior perimeter of the masonry wall of the stone enclosure. The rest of the circumference is traced by an arc (DF) with angle ω equal to about 60°. It is part of a circle with center at E and a radius of 2.5 modular units, equal to the one in the previously discussed floor plan. The two arcs are joined by two straight lines BD and AF. This is exactly what Alexander Thom and his son Archibald S. Thom classified as an "egg" shaped structure category **(vi) type II**, see previous section.

This alternative floor plan, although simpler in form than the previous floor plan, and much more "egg" like in shape exactly fitting a Thom type classification, it doesn't enjoy the fine approximation of that shown in Figure 5.1. It suffers from an almost unacceptable deviation from the existing conditions at the norther section of the floor's design. One may be tempted to assume some construction imperfection there at that section of the perimeter wall is responsible for that deviation of an otherwise intended perfect "egg" shape. However, this would imply taking undue liberties with the design. Since much rides on such approximations, namely complexity in design thus age of the structure, one must be very cautious in accepting such deviations. In any case, a more precise actual floor plan, preferably in digital form, is of course needed to resolve this tradeoff between the two shapes in Figures 5.1 and 5.2.

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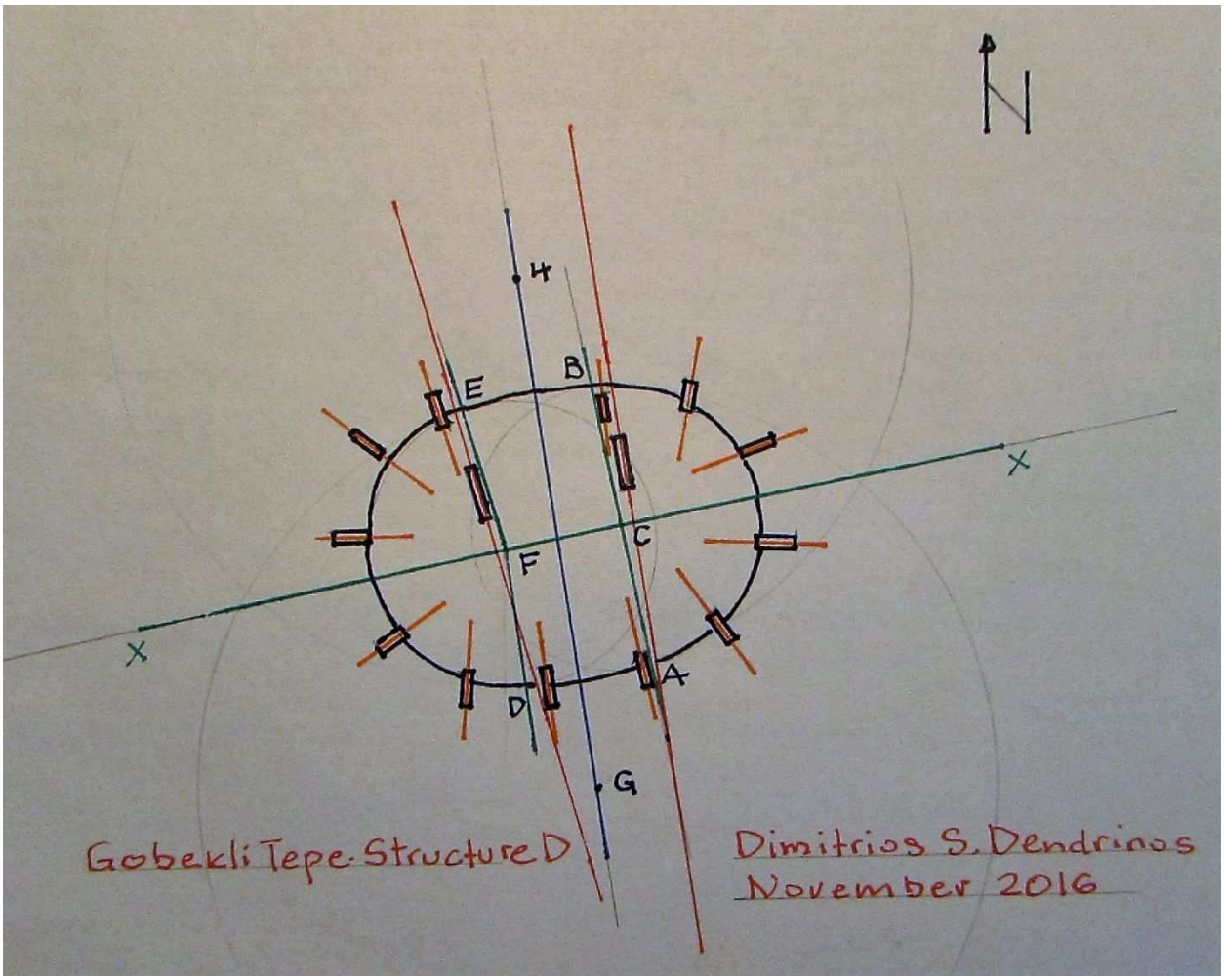

Figure 5.3. Structure D's Layer III decomposition into its constituent parts; the enclosure's axis of symmetry and orientation is shown (the **xx** line has a current azimuth of about 80°, that is almost 15° more than that of structure C), roughly pointing to the sunrise during summer solstice. This might be the springboard to all pseudo-elliptical classifications the Thom's offer in [10]. Author's drawing.

We now switch to the floor plan of structure D, shown in Figure 5.3. This is a symmetric floor plan design calling for four circles, as did that of structure C of Figure 5.1. The eastern and western sides of the interior circumference are traced by two equal in radius semicircles, one at center C and one at center F with a radius equal to 2.5 modular units. The eastern half semicircle has diameter AB, whereas the western semicircle has diameter DE. Arcs AD and BE belong to two equal in radius circles, one at center G and the other at center H, and radius about equal to 6.5 modular units. The distance between the two larger circles' centers is about 8.5 modular units.

The symmetry axis, **xx,** which goes through the two centers C and F. has a current azimuth of about 80° and of course bisects the distance GH. The HG line is at 355°, and it is almost parallel to the orientation of monolith (T-shaped pillar) #18, see Figure 2.2. Radius EF of the western semicircle touches the other pillar, monolith #31 and it runs parallel to its orientation. Almost all six orthostats' orientation to the right (the eastern semicircle) face center C; whereas all six at the left (the western semicircle) face center F. The implications of these convergences by all twelve monoliths shall be addressed in the next section, regarding the megaliths' shadows.

In reference to the Alexander and Archibald S. Thom classification scheme, structure D's configuration does not correspond to any of their types. The closest is that of type {(vi) II}, if one is to approximate the arcs of the two large circles by straight lines, a practice admissible under the Thom's classification. It is however the author's view that the symmetry of the structure, its primitive form containing two equal in radius circles just placed at a distance close to their radius might be an indication of a primordial schema pre-existent to even the simplest case in Thom's scheme of stone circles as found in [10]. In that capacity, GT is the springboard to the unravelling of the whole gamut of the Thom's configurations of Western Europe. If so, the temporal proximity of the two designs must be assumed, since buried and lost from collective memory complex forms such as these pseudo-elliptical configurations do not suddenly "revive" or get "resurrected" or are "rediscovered" after millennia of total and deepest oblivion.

It would be of interest to seek some functional (besides formal) explanation for these "egg" like, or pseudo-elliptical shapes. To interpret these almost but not quite elliptical shapes as attempts to draw an egg, possibly as an archetypal form or symbol of "beginning" or of "genesis" is a strong possibility of course, but an easy route to take towards an understanding of the late Mesolithic to early Neolithic psyche. It would simply be too simplistic. Other, far more elaborate and complex cultural factors must have been in place to explain this degree of strength and durability of such a complex morphological scheme. And it must have had something to do with architectural **function**.

Such pseudo-elliptical forms must have offered some advantage over other, simpler and by then well-developed floor plans. The key to answering this perplexing question must be sought in the real (not apparent) orientation of the enclosure. The top of the (possibly narrower, smaller in radius) arc could have been the place the top of the hieratic body in that society's elite structure would occupy, with the lower echelons and the participants in these cultural gatherings and

ceremonies occupying the wider arc. The floor plan thus obeys the old architectural maxim, that **form follows function**. It will be of interest to ponder further this aspect of both functional and symbolic representation of Neolithic architectural form, especially in conjunction with the artwork found on the megaliths of GT. But this isn't the forum to do so. It is left for future work.

A point in reference to the outer rings of the structures at GT, also related to architectonic functionality: it seems that these rings do not stand at the same floor level as the central Layer III rings. Individuals standing there or seating at their benches could observe the happenings at the central ring enclosure. As these outer peripheral rings were later additions to these stone enclosures, they must represent phases of growth, possibly reflective of overall demographic growth in the human settlements served by the site and reflective of the growth rate in the capital stock accumulation of the site itself over time.

The megaliths' shadows

No perfect understanding and appreciation of GT can be obtained unless the shadows of the monument's structures, especially the shadows of its megaliths, are fully studied and analyzed. From a casual look at any photo of these orthostats and pillars, and the drawings of Figures 2.6, 2.7, 5.1, 5.3, 5.4 which contain the real orientations of both structurers and their monoliths (the T-shaped pillars and orthostats), as well as from Figures 2.2 which has a drawing with the megaliths' approximate and the structures' apparent orientations, one recognizes that these stones' width to depth to height ratios and direction of the monoliths' width in conjunction with their locations were not random or haphazard. They not only obeyed some concrete architectural rules, but they also had some abstract symbolic meaning for the architect of the monumental structures. They have been so placed and oriented so that they inter-relate both in an intra-structure and inter-structure manner. The megaliths do not only define the enclosure, but they also define connections among enclosures. Of course these connections go far beyond mere symbolism, which is not a topic of this paper, but determine architectural and engineering conditions for the monument – sizes, proportions, spacing, and the like.

Furthermore, these stones were placed at specific points so as to interact to the extent that their **shadows** are concerned, during the sunny days and at moonlighted nights. In their shadows' motions interactions occur during both day and night. Light is a prime component in an architect's design, and light and lighting played a major role in Neolithic Architecture, see [2] for more on this subject in the case of the Neolithic megalithic monuments at Carnac, in Brittany, France.

From the set of Figures 2.2 to 5.4 and given the orientation, height, width, depth and placement of the T-shaped monoliths within each structure, it is evident that some **choreography** was staged within each structure, and some **male-female allegory** was intended. The shadows of the

two pillars at the center of these structures in their daily motions leaned on the various orthostats during specific times of the day, and on each other. That role, in combination with the artistry on the pillars and orthostats, was part of a decision that influenced their specific location and orientation. It is highly likely that the shadows' interplay was intend to convey some symbolism.

An example: for T-shaped orhtostats #23 to the right and #11 and #12 to the left of the outer ring of structure C, Figure 2.2, as standing above the level of the central ring and casting shadows from the southern side of the enclosure, these shadows cast must had enough lengths to hit the two central pillars, thus linking their themes. The specifics of course in that interplay require a far more accurate floor plan and front sections than the gross floor plans supplied here.

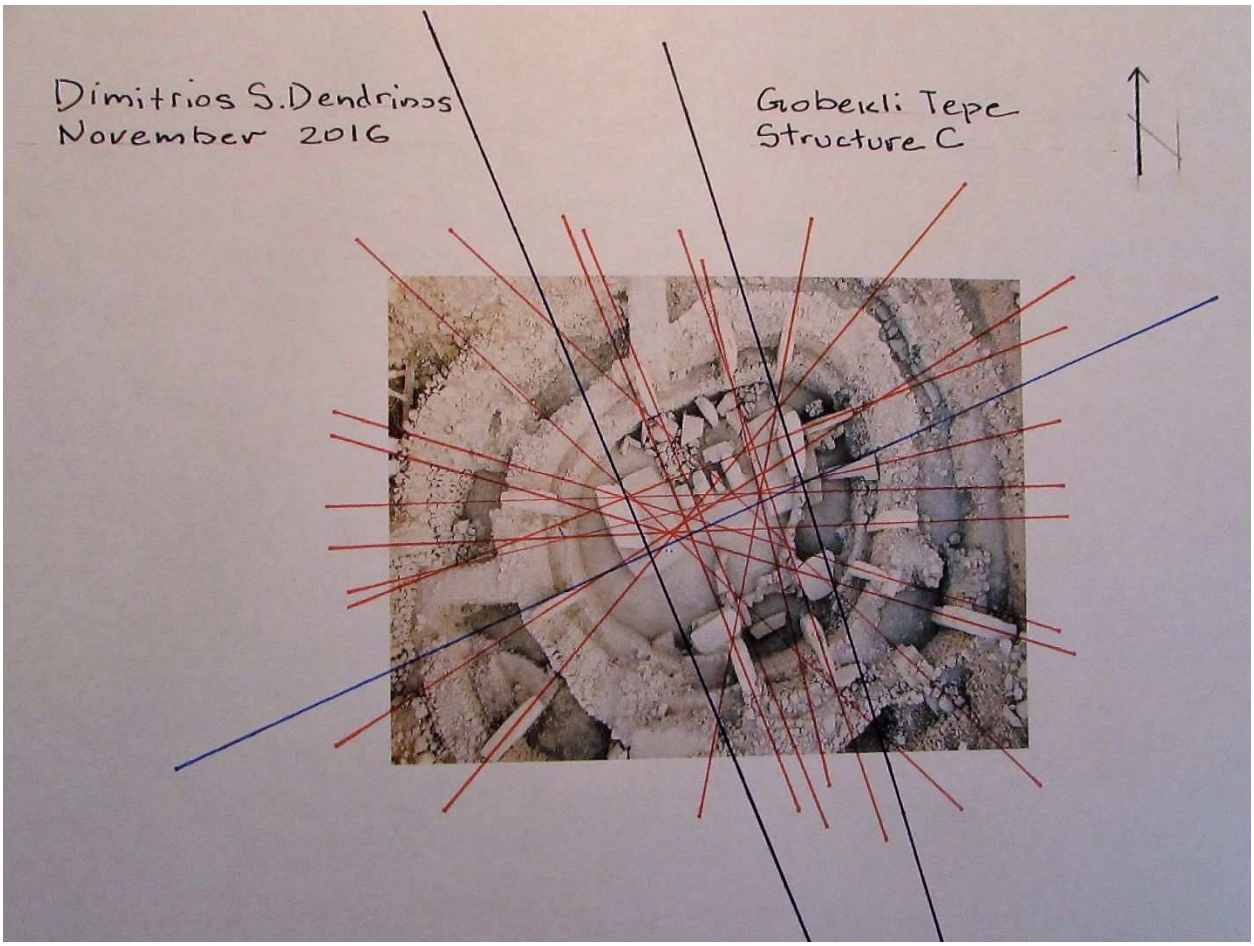

Figure 5.4. Structure C's multi-directional orientation of the T-shaped pillars (the two lines in blue running from the northwest towards the southeast) and orthostats (indicated by the red lines) in reference to the axis of approximate symmetry and the enclosure's orientation (the blue line running from the southwest towards the northeast). The whole enclosure ensemble of pillars and orthostats was a staged choreography by way of their shadows' daily motion. Author's drawing.

In the specific case of structure D, with the twelve orthostats tugged into the enclosing masonry wall, it may suggest that **a hexadecimal daily clock system** was in effect, whereby specific shadows of specific orthostats during the day would indicate a specific hour of the day. More precise drawing (possibly by scanning) of these orthostats and their exact orientation might offer the possibility to test this suggestion.

As mentioned in [2], any pillar raised from the ground and free standing (be that a stone, a menhir, or in this case a megalith at the center of structures C and D), can automatically act as a gnomon of a sundial. To what extent this is translated into a clock of course depends on the culture that raised the monolith sophistication in Metrology and Astronomy. For that to be determined though, far more exact drawings of these structures are required.

What makes this particular monument of interest is the variance in the number of monoliths in each structure. It allows for a far more complex sundial system to be set up, than a simple case of one rod with one style on a horizontal reference plane. Especially if the monoliths have different leanings and they are positioned at different angles to the ground level. In fact some of the pillars and orthostats top section "the head" of the monolith, has inclines that are not to be dismissed as errors or shortcomings in the quarrying process. Then, possibly, fractions of the time unit length (whatever that time unit might have been) could be obtained, as different angles would be involved on the flat plane of reference. As already noted, the twelve orthostats of structure D may indicate the presence of a hexadecimal type daily hour system embedded in these structures. This is an angle of work with a great potential to further pursue in regards to the archeological site at GT.

Structure C's date: Late Mesolithic to Early Neolithic, circa 5000 BC+/-250y

Gobekli Tepe's burial: a Bronze Age event

Before we suggest a date for both the initial construction at GT, the sequencing of the various structures unearthed thus far, and how long these structures lasted as sites of ceremonial and other cultural activity, one must address the topic of its burial, both in dates and in its underlying motivation. To answer the question on "when" did the burial occur, one must identify the "why" was the structures buried. It is assumed that they were all buried at about the same time. This will guide the analysts in addressing the question as to when they (whoever these peoples were) did it.

Evidence already discussed points to the fact that at least part of the burial was due to a malevolent intent. The destruction seen in the monoliths and the erasing of some of the reliefs on them are indicative of some hostile action as being the agency that buried in part the structures. The unfinished decoration of certain megaliths (see case of structure B) points to the

fact that the burial occurred at a time when more construction and possibly more decorative activity in the form of reliefs on T-shaped orthostats and pillars were anticipated.

However, there are some indications that the act of burial had a benevolent intent as well. Not all megaliths were damaged, and some filling by soil was carefully done to preserve artifacts and structures. Thus, one is led to the conclusion that, in part, maybe the initial phase of the burial was done with intent to preserve from apparently perceived imminent danger and destruction. Whereas, the last phase of the burial was undertaken with intent to partly destroy and bury into oblivion whatever cultural meaning was embedded into these structures at GT. From the state of preservation in structures C and D, it seems likely that structure D was buried first, and under a benevolent intent to preserve it; while structure C was buried by the tail end of the burying operation, and under a somewhat malevolent intent.

Who were the agents of the malevolent burial is not known. However, one can speculate that outside (from both the north and the south) cultures could have invaded this fertile lands of Upper Mesopotamia and the riverbanks of the northern Euphrates and buried the structures – of both, the older Nevali Cori and the younger GT. There are some candidates for this invasion, the southern cultures of Imperial by now Ubaid phase Lower Mesopotamia, and the invading culture of what would eventually become the Hittites from the north. In none of these cultures do we observe the architectonic features of the Nevali Cori and GT megalithic structures. We do however observe some decorative relief patterns from GT, specifically the triple purification symbol at the top of orthostat #43 of structure D (discussed more extensively in [1] by the author) in later Lower Mesopotamian cultures and the Sumer of the Eanna District of Uruk V. It was about the beginning of the Uruk XVIII Eridu period that very likely saw the construction of enclosure C at GT; it was very likely the end of Uruk II when GT's structure C was buried. It was the time when significant social upheavals occurred in Mesopotamia, especially at the Lower Euphrates.

This set of arguments now sets a time frame for Gobekli Tepe's burial, just prior to the beginning of the Bronze Age.

Gobekli Tepe's start up: middle Mesolithic

Given our analysis in previous sections, about the initial construction phase of structure D (the oldest structure according to the archeological team, its so-called "layer III" phase) and our detailed analysis of structure C, which we already pegged to a post Jerf El Ahmar and after Catalhoyuk/Nevali Cori at a late Mesolithic time frame, one can now roughly estimate the time period within which the rest of GT's structures A, B, E, and F were constructed, and refine the initial construction dates for structures D and C. One can also identify the migration phase of the GT influences towards the European subcontinent of Eurasia and the early construction at both Malta (see more in Appendix) and Carnac (see [2]).

None of the arguments discussed in [1] will be repeated here, except to refine the architectural points made there and elaborated in previous sections of this paper. As we defined: first, the upper bounds for Gobekli Tepe's dating, the Jerf El Ahmar Architecture on the pseudo-elliptical forms in structures C and D, and the Catalhoyuk and Nevali Cori architectural elements for both the rectangular structure at GT, as well as the intermittent and regular spacing insertion of orthostats along the masonry wall of the enclosures; and second the lower bounds of GT's structures from both, the Carnac's le Menec western cromlech, as well as the apse type clustering of the Maltese Archipelago megalithic structures combined with its artistic influences from GT. Next, we are now attempting to put a more specific date on GT's structures C and D, and the rest, including the rectangular structure of Figure 2.3.

Structure D at GT must have been constructed into middle 6th millennium BC, as the primary anchor center surrounded by secondary possibly auxiliary structures E as well as B, this from an Urban Design viewpoint. Access to the entire monument was from the south. From the ground, the position of structure D was the most visible, from the east, north and west – keeping in mind that north was the key direction: that was where the Euphrates flowed, and there was where the older Nevali Cori settlement was located on the Euphrates riverbank. This proximity must be the key reason why structure D is the oldest structure at GT.

Apparently, residential density increased, population and demographic conditions improved, per capita foodstuff production and consumption grew around the GT site close to the end of that last Mesolithic millennium. As a result, additional demand for monumental expansion was generated. That led to the construction of the more architecturally complex, multiple-ring, and now more dominant structure C, along with structures F and A. It was also the time in all likelihood that need for auxiliary space, possibly to house the growing in size hieratic elite, was generated and the rectangular structure of Figure 2.3 was built.

A striking feature of the GT archeological site is the multinucleated articulated structure of the monument. Multi-nucleation in Urban Design and Planning occurs when the economies of scale generating a force leading into concentration of activity into a single spatial unit start to break down, and diseconomies of scale settle in (in the form of high densities, congestion and the like). Then, the dynamic self-organizing principle of human settlement activity produces a hierarchical scheme of networked and linked centers, usually taking the form of a dominant central core surrounded by a number of peripheral sub-centers. This multi-nucleated form is the spatial structure of GT and evident in the monuments of Malta which were influenced by GT's site plan, see Appendix.

This historiographic narrative would put structure C's construction startup close to the end of the 6th millennium BC and the dawn of the Neolithic in Western Eurasia. This threshold marks a significant date, place and form, as it was at that junction that structure C's morphology became basically a Neolithic form of choice – that of the pseudo-ellipse – and it got hold of the grounds at megalithic construction sites in Eurasia over the next three millennia or so. Although the origin

of that form was Jerf El Ahmar, it was GT that adopted it, expended it, and diffused it in space-time. Usually, in the Mesolithic and Neolithic one must supply a date with a spread from the plus to the minus of at least ten percentage points (i.e., about five centuries in this case). It is under this rule that the date is given as 5000 BC +/-250 years. It turns out that this roughly coincides with another critical date, the approximate initial construction date of the western cromlech at le Menec, at Carnac, in Brittany, and most importantly it matches well with the estimated elapsed time the spreading of an innovation required back then.

Time involved in the spreading and diffusion of innovation in architectural design can be pegged to the speed of movement of other technologies at that time, especially the speed in the adoption of agriculture during the Mesolithic. The author has addressed this issue in his paper in reference [16]. Adjusting for potentially higher speeds in the early Neolithic, from those of the early Mesolithic, as ease of travel must had improved considerably, one can safely estimate that the speed of diffusion must had been cut at least in half possibly to one third for such long distance influences to reach their destination, be adopted and materialize.

In Figure 18 of ref. [16] the author points to a speed of movement in the adoption of animal husbandry in Western Eurasia in the Mesolithic (the 10000 to the 5000 BC time period). The speed of movement was such that an innovation from the Taurus Mountains of southern Asia Minor to Malta took about three millennia, and to reach Brittany approximately four millennia. By the turn of the Neolithic, however, an idea in design must have travelled in considerably higher speeds and had taken a significantly less time period to reach Continental Europe and then Brittany to the West and Malta to the south. Within this framework, it is reasonable to expect that the time from GT to Carnac for the pseudo-elliptical form to travel would vary between one millennium and half of a millennium. QED.

Conclusions

In this, largely Architecture based analysis of the monuments at Gobekli Tepe, a number of propositions were stated and evidence was supplied to document them. Key among the propositions advanced here in this paper (and in conjunction with [1]) are the following.

Structures C and D have complex floor plans which can be quite effectively de-composed into their elementary parts by employing slight variations of a scheme developed by Alexander Thom and his son Archibald S. Thom, as expanded by this author in [2]. This scheme deconstructs all pseudo-elliptical floor or site plan shapes into a minimum set of arcs and/or straight lines, and

pegs an evolutionary path according to their complexity. It was found that both structures C and D comprise of “egg” shaped stone enclosures.

The Architecture lineage of the Gobekli Tepe structures was reviewed and found to be later than that Architecture of both Catralhoyuk and Nevali Cori. Lineage, through the “egg” shaped structures to the Architecture of Jerf El Ahmar was established in a previous paper by the author and expanded here. Potentially, the pseudo-elliptical shape of structure D’s stone enclosure could be the simplest “egg” form and the springboard of all types in the Thom’s classification scheme found in [10]. Further, the Architecture of rectangular shape structures found in Catalhoyuk, Nevali Cori and Gobekli Tepe was analyzed and used to more finely calibrate all three sites’ chronology.

Orientations of both structures C and D and their monoliths were analyzed. These structures were shown to possess an apparent (point of entry based) and a real orientation, the latter being their axis of the stone enclosures’ floor plan symmetry. Real orientations point to a link with sunrise during the summer solstice.

Elements of the enclosures’ construction (plaster coating of the megaliths and the terrazzo floors) and the monoliths’ perfectly rectangular shapes and artwork were analyzed and found to belong to late Mesolithic and Neolithic practices.

Shadows of both central pillars and orthostats cast in the enclosures were viewed as a means to embed a symbolic choreography, and possibly as parts of a complex sundial type mechanism based on the hexadecimal system implanted in the stone enclosures’ structures. The hexadecimal system is largely based on the twelve orhtostats of structure D.

The burial of the monuments was done in a hurry and it likely commenced as a partly benevolent act; it ended with a likely malevolent action by the end of the Neolithic and just prior to the beginning of the Bronze Age.

A concluding comment connected to the news regarding GT’s potential nomination for UNESCO World Heritage List is in order as it touches upon some major archeological issues here and in general. The recent decision by the Turkish government to nominate GT for inclusion in the UNESCO World Heritage List, see [21], is of course a richly deserved nomination. However, it is worded in terms that are not accurate. Obviously politics are involved in the nominating process, and politics will be involved in the determination proceedings. That is quite unfortunate but maybe inevitable. In any case, this paper in conjunction with [1] hopefully documented and made clear that GT is not a 12-thousand year old structure, and definitely not Humanity’s “first” temple, although it is a monument to human ingenuity, artistry and skill, and its influences have been far reaching over millennia throughout Western Eurasia, as it has been documented here. A “first” Temple would not had the extraordinary complexity in construction and design that GT’s structures C and D display. A much better candidate for “first” Temple is found at Nevali Cori’s Temple and Jerf El Ahmar’s central pseudo-elliptical building, see [1]. Complexity in architectural

design and construction engineering usually is associated with significant advances in a culture's wealth and sophistication; they are not the outcome of start-up construction processes, of early stages in a culture's developmental path. Gobekli Tepe is not, by any stretch of imagination, a "start-up" phase of a poor in resources and restricted in foodstuff culture. The Younger Dryas were a period of harsh environmental conditions, when organized agriculture had not gotten full and firm hold yet of the fertile lands of the Upper Mesopotamia. Demographics were bleak. No culture, under such social conditions is likely to have built the scale of a monument Gobekli Tepe's structures represents. Then, millennia later, when the foodstuff is abundant, demographically and environmentally conditions had considerably improved, it goes ahead and buries it. It simply doesn't make much sense.

APPENDIX: Gobekli Tepe, Malta, Stonehenge, Menorca

This paper doesn't intent to discuss in any great detail the Architecture and Art of the numerous Phases of the various Maltese Archipelago Temples. Only some general and abstract remarks will be made to point out the strong similarities and equivalences and in effect the specific morphological and structural influences exerted from GT's Art and Architecture on the Maltese artifacts and construction. The author in [16] has analyzed some elements of the Maltese Architecture, and some key references are supplied there about its megalithic construction. In Figures 6.0 – 6.4 four photos from Malta's megalithic temples and a photo from GT are provided. In Figure 6.1 floor plans and artwork from GT and Malta bearing striking similarities are shown.

In addition, a photo is presented, Figure 6.5, from the Spanish island of Menorca, which depicts one (out of many) pre-Talaiotic and Talaiotic culture monuments there. Although the sites were inhabited by late Bronze mainly Iron Age set of cultures, when these monuments were built, their Architecture has been linked to that of Stonehenge, see [20]. Be that as it may, the T-shaped megaliths as well as the dry masonry wall which enclose these raised megaliths bear a lot of similarities in their construction to GT structures' Architecture. It is obvious that the architectonic influences from Jerf El Ahmar, to GT, and through GT to Malta, to Stonehenge, to Menorca have been deep indeed.

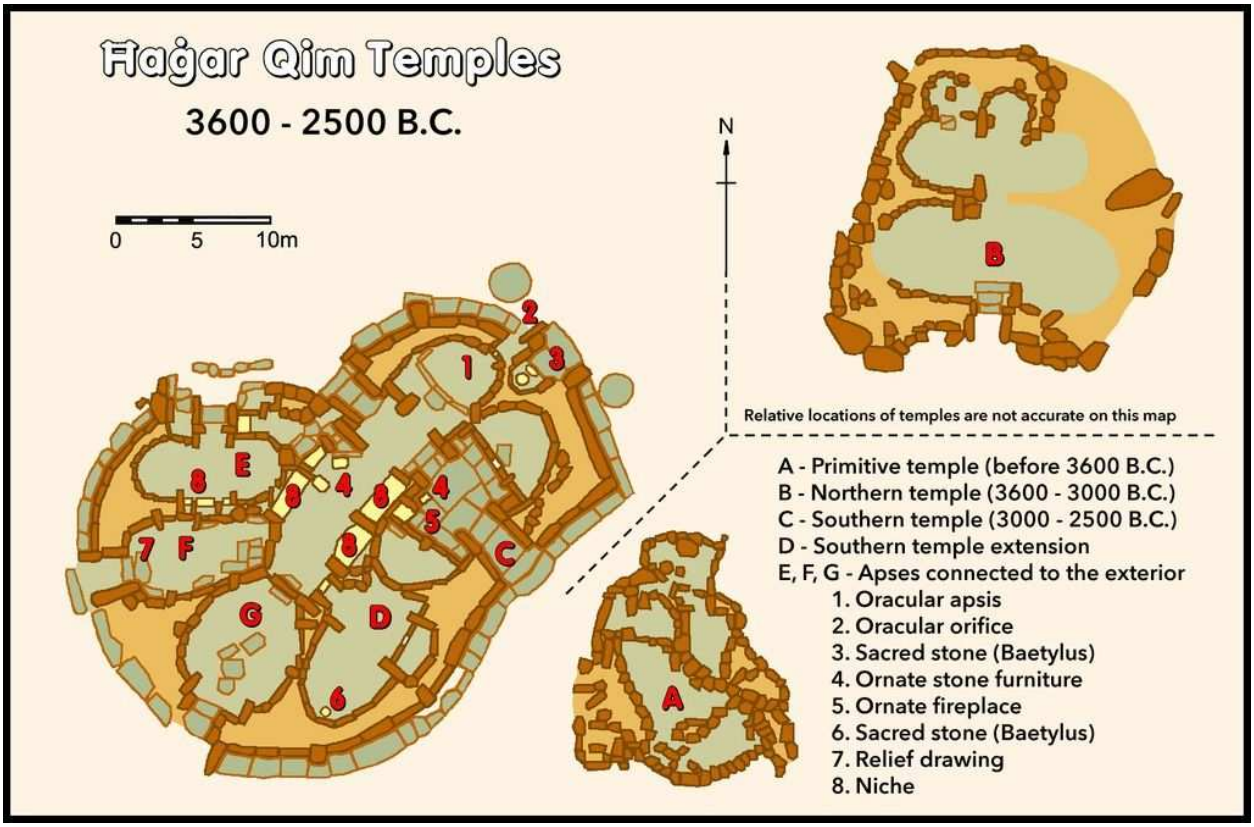

Figure 6.0. Malta, the site plan of the Hagar Qim complex of temples. Of special interest is the northern temple B with the half pseudo-elliptical apses structures; these apses were transformed into the full pseudo-elliptical shapes in the C section of the Hagar Qim complex (Southern temple) Phase. Notice the scale of the pseudo-ellipses, almost identical in size as the structures of GT. Clustering of the temples' sections is reminiscent of GT. Source: reference [17].

Figure 6.1. Malta: the Tarxien Phase Temples (post 3100 BC to 2500 BC) in aerial view, clustering of pseudo-elliptical enclosures on a hill. Globigerina limestone construction.

Figure 6.2. Malta, Hagar Qim Temple C. The element of using orthostats embedded on the pseudo-elliptical floor plan of a structure is an element first encountered in the floor plan of Jerf El Ahmar, and also at Nevali Cori. Architectural construction and plan details bear strong similarities to those at Gobekli Tepe; they are more complex and thus of later construction, possibly in an inverse relationship between an increase in complexity and time ellapsed.

Figure 6.3. Gobekli Tepe: a flock of dodos in relief at the base of a central T-shaped pillar.

Figure 6.4. Malta, Tarxien Temple altar relief; a herd of ibex.

Figure 6.5. Menorca, Spain: Taula de Torralba an early Iron Age monument, interpreted as a place of healing and with orientation towards the Constellation of Cassiopeia. The raised T-shaped megalith (the two-piece pillar, consists of an orthostat and a lintel) is anchored deep into the ground. Its dry stone enclosure is punctuated by orthostats, in a qualitatively similar manner as that of Gobekli Tepe. Source of photo: [20]; see also [21] for more on this cultures and their monuments.

Figure A1. Structure C viewed from the North-East at sunset. The western-northwestern tell is seen to the right. Source of photo: National Geographic ref. [9].

ADDENDUM: topographical photos of the Gobekli Tepe site

The following photos, all from Google Earth maps and from different angles, are offered as a means to obtain a good bird's eye view type of perspective on the immediate area surrounding the GT site. What is apparent by viewing these photos is that the choice to locate the complex of stone enclosures there, had much to do with accessibility and visibility. By occupying that site the ceremonial, social, cultural (in fact multi-functional) complex was accessible to locations East, North (towards the Euphrates River) and West. In altitude, although at a high ground, it isn't situated in too high of an elevation, just about 500 feet above the mound's ground level but yet quite dominant over the immediate landscape.

In terms of visibility, it commended a wide viewshed from the North, and partial from East and West. Although it could be seen in part or *in toto* from all of these directions, yet it was high above all and in relative isolation. Thus, this location was a double play on both accessibility and dominance. As pointed out though in the text, the immediate surrounding area at GT must have

been the grounds for a widespread, relatively densely populated human settlement during the late Mesolithic. This was the conclusion drawn from the mere scale of the GT complex.

Figure A2. Aerial view from 3670 feet above ground; contour-following distance .43 miles. Notable is the current agricultural use at the photo's right. The area in the photo is about .35 square miles. North is straight up.

A brief note on the term "Gobekli Tepe" is also appropriate and in order at the end of this study. Archeological names carry heavy a baggage, with far reaching associations and implications. The term Gobekli Tepe (meaning "potbelly hill" in Turkish) is a name of course not reflective of either the culture or the name that culture used in referring to this place when the structures at that site were constructed. Metonomasia (ΜΕΤΟΝΟΜΑΣΙΑ), i.e., change of a (topographical in this case) name, is a phenomenon critical in the study and understanding of the often violent socio-cultural transitions a location has undergone through its history. Unfortunately, this isn't the case here, where an apparently recent (and irrelevant) name has been attached to a place, without any reference to its original history or culture.

The same observation applies to a set of other names used for human settlements in Asia Minor tied to the site and explored in this paper. This is in sharp contrast to a neighboring site, Sanliurfa, a site rich in history and with a plethora of metonomasies (plural term for "metonomasia") over

the course of its past three or so millennia of written history. However, this remark about GT's name goes far beyond sites in Asia Minor. "Newgrange" and "Stonehenge" aren't terms used by those (unknown) cultures that built those monuments there as well. Regrettably, these more or less arbitrary names often cloud and distort a locale's historiography and bring in political considerations, totally unrelated to those magnificent monuments' essence and to their builders.

It would had been far more efficient and optimal from a Science perspective, if all these sites were to be given some abstract designation, such as a letter and a number, similar to those assigned to objects (such as Quasars, Galaxies and Stars) on the celestial sphere in contemporary Astronomy and Cosmology.

Figure A3. Aerial view from 3670 feet above ground level; distance in yellow line is .63 miles

Figure A4. Aerial view of the Gobekli Tepe site from the East from 3670 feet altitude.

Figure A5. Aerial view of the Gobekli Tepe site from the Northwest (3670 feet altitude).

Figure A6. Aerial view of the Gobekli Tepe site from the South (3670 feet altitude).

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