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Unreviewed Mixed Matters Article:

Nesshenge: an Experimental Neolithic Henge with 15 Years of Exposure

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Our understanding of the planning processes involved before any Neolithic structure was physically built, from the moment when it was conceived in a person's mind up to the point of its construction requires further investigation for which experimental archaeology can provide some direction. During the British Neolithic period, circa 4000-2500 BC, we witness the building of numerous ceremonial, domestic and funerary structures which dominated the landscape. The exact number of structures created is unknown, although it is possible that we

could be looking at a figure in the thousands (Hill, 2024). If we accept that the architectural form of these structures was so designed that their appearance alone indicated the specific types of rituals or domestic usages that could be legitimately held there (see Fleming, 1973, p.189; Bradley, 2007, pp. 46-50), then accordingly, their respective designs would have been well thought out: their architecture had to meet the visual and experiential expectations of the people. Overall, one is led to consider the possibility that any form of construction was the result of deliberate thinking and that the Neolithic builders were working to specific plans or blueprints in advance of any building work. Furthermore, moving from design to physical form required setting out, a technique which implied measuring of some description. This is where we hit the major drawback to this assertion, which experimental archaeology can offer insight. The British Neolithic communities were preliterate, and they have left behind no written records or any sculptured, pictorial reliefs at their building works which could be interpreted as evidence of "architectural" schematics. Nor do we find surveyor marks or hints of measuring-notches scratched on the surfaces of those orthostats used to build their monuments. We have yet to recover any material evidence of a British Neolithic numeracy system that could have supported those prehistoric surveying and setting out techniques that must have been needed to build complex monuments such as Stonehenge. Such a difficult subject should not be ignored and experimental archaeology may offer a solution for consideration.

> The reconstructed Nesshenge represented an important comparison with Stonehenge's original architecture. The real Stonehenge appeared during the Middle Neolithic period, around 2950-2900 BC.

Introducing Nesshenge

It is not every day that one gets the opportunity to build an experimental henge earthwork (See Figure 1). After 15 years of "weathering", one is amazingly surprised to see that it not only survives but has partly contributed to the enjoyment of the thousands of visitors to Merseyside's Ness Botanic Gardens, and christened "Nesshenge" by *Antiquity* Journal (Hill, 2009a). My replica henge represents an ongoing archaeological experiment for serious study. As an "earthwork" it has been exposed to some of the "best and worst" of the British weather. So it is time to see what affect this has had on this experiment.

The story of Nesshenge began some 16 years ago as part of my doctorate research. As luck would have it, I asked the University of Liverpool whether I could utilise one of their many sports fields to map out the ground design of Stonehenge using experimental methods. This idea then progressed to expanding the project as part of the university's contribution towards the City of Liverpool's 2008 European Capital of Culture.

Referred to as the *2008 Stonehenge Rope Experiment using the principle of Occam's Razor*, this experiment demonstrated how the ground plan of Stonehenge could have been

designed without injecting anachronistic mathematics or astronomy. The rudimentary procedures involved folding a length of rope, finger counting numeracy and using the sun's shadow at midday for orientation. In short it demonstrated how one length of rope, 180 ft (55m) long, could have been repeatedly folded to mark out Stonehenge's ground plan (Hill, 2009b). A white line marker machine was then used to visibly mark out its design to enhance public viewing (See Figure 2).

Positively, media exposure for the experiment caught the attention of the (then) curator of the university-owned Ness Botanic Gardens, Paul Cook, who subsequently contacted me and asked if I could build a physical replication of the experiment within a section of his "Wildflower Meadow." He also offered the Garden's work force and other materials to help build it.

Logistics

The first task was to identify an area within the meadow where Nesshenge could be built. Notably, there were no restrictions on the size of the area, and I think Paul would have been happy with seeing a full-size replica of Stonehenge's ditch and bank earthwork being constructed. Indeed, it would have made a tremendous visual impact within the central low-lying area of the meadow. However, I wanted to incorporate a number of astronomical alignments within the experiment, and this could only be achieved by placing Nesshenge at the higher level of the meadow. Having selected the appropriate piece of land and surveying it, I had to make some adjustments to its design - the replica henge would have to be scaled down in size. Having selected the area for the Nesshenge, I still had to agree with Paul the various other tasks involved with construction:

1. Availability of "spare" stone
2. The provision of 56 timbers for the Aubrey holes
3. The human logistics involved

Fortunately, Ness Gardens has its own "building yard" with a good supply of medium-sized garden stones which I could use. Also, even back as far as 2008, ecological philosophy determined the choice of the 56 wooden posts I needed to stand in "my" Aubrey Holes. Thus, several trees which had already been identified for trimming provided excellent timbers for that purpose. Regarding the manual labour required to build Nesshenge, four gardeners and a digger (plus driver) were offered for three full days. Having agreed and scheduled these logistics, the work was ready to start.

The dimension for the Outer Ditches at the real Stonehenge cover an area some 360 ft by 360 ft (110m x 110m) but the raised meadow was smaller in size. Compromising, I had to scale down the reconstruction accordingly i.e. using a length of rope 67 ½ ft (20.5m) long to set out the ditch i.e. covering an area of 135 ft x 135 ft (41.1m x 41.1m). This is a breakdown of, those

measurements at both Stonehenge and Nesshenge as well as their respective calculations for folding the ropes at the latter experimental henge (See Table 1).

Feature	At Stonehenge	At Nesshenge	Calculation for Nesshenge's features
Diameter of Outer Ditch	360ft (110m)	135ft (55m)	Use the 67 ½ ft rope to set out the diameter.
Width of Outer Ditch	13½ft (4.11m)	5.062ft (1.54m)	Divide the 67 ½ ft rope into 8. Cut off one eight. Fold into 5. Use three lengths to set out the Outer Ditch.
Diameter of Inner Bank	157½ft (47.88m)	59.06ft (18m)	Divide the 67 ½ ft rope into 8. Cut off one eight. Use residual rope to set out the centre line of the Inner Bank.
Width of Inner Bank	18ft (5.48m)	6.75ft (2m)	Divide the 67 ½ ft rope into 8. Cut off one eight. Fold into 5. Use four lengths to set out the Inner Bank.
Diameter of Aubrey Holes Circuit	141¾ft (43.2m)	53.154ft (16.2m)	Divide the 67 ½ ft rope into 8. Cut off one eight. Then deduct a further one eight from residual. Use residual length to lay out the circuit of Aubrey Holes.
Distance between Aubrey Holes	15¾ft (4.8m)	5.906ft (1.8m)	Use the discarded 5.906 ft rope from the Aubrey Circuit above and spread out each of the 56 Aubrey Holes.
Width of South Entrance	13 ½ft (4.11m)	5.062ft (1.54m)	Divide the 67 ½ ft rope into 8. Cut off one eight. Fold into 5. Use three lengths to set out the width of South Entrance.
Width of North-east Entrance	36ft (10.97m)	13.5ft (4.11m)	Divide the 67 ½ ft rope into 5. Cut off one fifth to set out width of North-east Entrance.
Distance of Heel Stone to centre of henge	258.75ft (78.8m)	97.1ft (29.57m)	Divide the 67 ½ ft rope into 8. Cut off one eight. Roll out 11 ½ times in north-east direction.
Distance of Slaughter Stone to centre of henge	135ft (41.1m)	50.62ft (15.4m)	Divide the 67 ½ ft rope into 4. Cut off one quarter and use residual length to set out the Slaughter Stone in north-east direction.

TABLE 1. A COMPARISON OF MEASUREMENTS BETWEEN STONEHENGE AND NESSHENGE (FOR FULL INSTRUCTIONS FOR SETTING OUT STONEHENGE SEE HILL 2009B.).

Getting started

The first "job" with construction was to clear the land upon which Nesshenge would stand. This involved strimming weeds and mowing grass. Fortunately, there were no large trees or excessive shrubs to clear. With the land surface cleared, I then used my methods of setting

out with the 67 ½ ft (20.5m) length of rope being used to mark on the ground the circumference of the henge's Outer Ditch. Wooden poles were then pegged out along the perimeter of that circuit. Next, standing at the centre of this ring, I measured the sun's shadow to identify a north/south line for the direction of True North (See Figure 3A). Then the other cardinal points were obtained by asking a gardener to stand on the north / south line and hold out both their arms parallel to the ground whilst facing True North: thus, the right arm pointed east and the left arm, west. This action then identified the east and west cardinal points on the circumference of the outer ditch made by the 67 ½ ft (20.5m) rope (See Figure 3B).

Of course, there are other ways of obtaining the cardinal points but this was the simplest way to do this here. And this procedure would also explain how the Neolithic people could accomplish both counting and orientation for setting out any monument's design without leaving a physical imprint in the archaeological record (see Hill, 2015; Hill, 2019; Hill, 2024).

Finally, once I had identified the cardinal points and determined orientation, it was time to set out all of the internal features at the henge. Mathematical calculations for folding the rope were determined by finger reckoning i.e. fold the 67.5 ft rope once equalled one finger, fold it twice - two fingers, etc. Undoubtedly, I only had three days to complete the experiment so I had to revert to utilising modern equipment to finish the job (See Figure 4).

The Result in 2008

The reconstructed Nesshenge represented an important comparison with Stonehenge's original architecture. The real Stonehenge appeared during the Middle Neolithic period, around 2950-2900 BC (Cleal, Walker and Montague, 1995, p. 63). It initially consisted of a ditch and bank earthwork surrounding a central area with two entrances. Circa 2800 BC, a ring of 56 (probable) timber posts were placed in what are now referred to as the Aubrey Holes (Darvill, 2006, pp.97-98). Importantly though, and it is noted that after 2008, there has been a new interpretation proposing that these Aubrey Holes might have alternatively contained standing Bluestones instead of timbers (see Parker Pearson, 2012). But I believe the evidence for what these holes originally contained is equivocal - it could be timbers, stones or even both and, it is noted, that there are still about 40% of these holes awaiting future excavation and therefore, until they have been examined, we cannot quite be sure what they held.

From 2700 BC onwards, Stonehenge became more of a cremation cemetery with about 240 cremations being deposited across the ditch, bank, central area and the (now) vacant Aubrey Holes (Pitts, 2000, p.121). Then, about 2650 BC, a double arc of standing Bluestones was set out and they remained in situ for almost one hundred years or so before being removed to make space for the raising of the great Sarsen Circle and Trilithons, circa 2550-2450 BC (Burl, 2006, p.168). These Sarsen stones were massive stones, each weighing on average about 35 tons and they were dragged some twenty miles from the Marlborough Downs to Stonehenge

(Atkinson, 1986, p.116). After raising the Sarsen stones the Bluestones were repositioned in two formations within the central areas of Stonehenge, sometime between 2200-2000 BC (Chippendale, 1999, p.271). Finally, around two hundred years later, two concentric rings of empty pit/holes were dug around the central stone settings, referred to as the X and Y Rings (Johnson, 2008, p.168).

Incidentally, I only added a few of the standing stones to the experimental henge to represent the Heel Stone, the Slaughter Stone, the recumbent Altar Stone and the four Station Stones. Also, five small uprights were positioned to represent Stonehenge's Trilithons whilst 30 recumbent slabs accounted for the Sarsen Circle lintel stones. I carefully positioned the henge so that it not only incorporated a number of important astronomical alignments that occur at the real Stonehenge but also aligned Nesshenge's north-east entrance (and the respective view across the henge) towards a special 'notch' amongst the south-west horizons, between the Welsh mountains of Moel Famau and Moel Arthur. Indeed, standing at the Heel Stone and looking across the north-east entrance on the winter solstice (21st December) one can watch the afternoon winter sun setting between the two mountains (See Figure 5).

The Flooded Ditches

The experimental henge came under attack from the elements almost immediately after construction. Within days heavy rain caused the ditches to flood, and they remained flooded throughout the winter of 2008 (See Figure 6). Interestingly, this flooding made me think about the purpose of henge ditches - were they all deliberately built to be flooded in this manner? Perhaps they were a source of water for the cattle that were herded by the farmers when congregating at prehistoric henges for trade, feasting and exchange; alternatively, the flooding may have contained some cosmological meaning linking sky, water and earth at the henge (see Richards, 1996). Or the water might have been used for ritual bathing by the people gathering at the henges (Hill, 2009a). Certainly, the incorporation of water as a natural element within the architectural design of a Neolithic henge is known elsewhere. For example, at Wiltshire's Marden henge, there, the river Avon was actively forced to flow into segments of its ditch, forcing it to remain in a permanently waterlogged state (see Wainwright, 1989). Notably, Nesshenge has similarly done so since 2008.

Nesshenge Today (2024 AD)

Nesshenge still survives and it continues to attract visitors who come to sit and meditate within the "sacred" space it provides. I also understand that some people gather every winter solstice afternoon and enjoy watching the sunset from the henge. Of the 56 timbers that once stood in "my" Aubrey Holes in 2008, only three remain today. Moreover, they are now rotted and unlikely to stand upright for much longer. The Outer Ditch has silted and continues to flood along its southern quadrant. However, the entire Inner Bank still maintains its form. I did note that "my" Slaughter Stone has been raised upright (although I cannot remember

whether I did this some time ago, again for health and safety concerns as it was (is) easy to trip over it when laid flat. Regrettably, the remains of the reconstructed stone-lined Avenue which ran from the north-east entrance towards the Heel Stone, has now disappeared whilst the latter stone is hidden amongst some undergrowth (See Figure 7).

I am also pleased to report that reconstructed henge now forms part of the University of Liverpool's EARTH (Experimental Archaeology Research and Teaching Hub) resource. Hopefully this incorporation will protect the henge for many years to come. This teaching hub (including Nesshenge) provides an excellent resource and opportunity for teaching experimental archaeology not only to the Liverpool University students but also to the wider public.

Keywords (re)construction

Country United Kingdom

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FIG 1. THE EXPERIMENTAL HENGE “NESSHENGE” AS IT LOOKED IN 2008 (AFTER HILL 2009A).

FIG 2. USING A LENGTH OF ROPE, FINGER-COUNTING NUMERACY AND THE SUN'S SHADOW, IT WAS POSSIBLE IN 2008 TO REPLICATE THE DESIGN OF STONEHENGE'S GROUND PLAN (AFTER HILL 2009A)

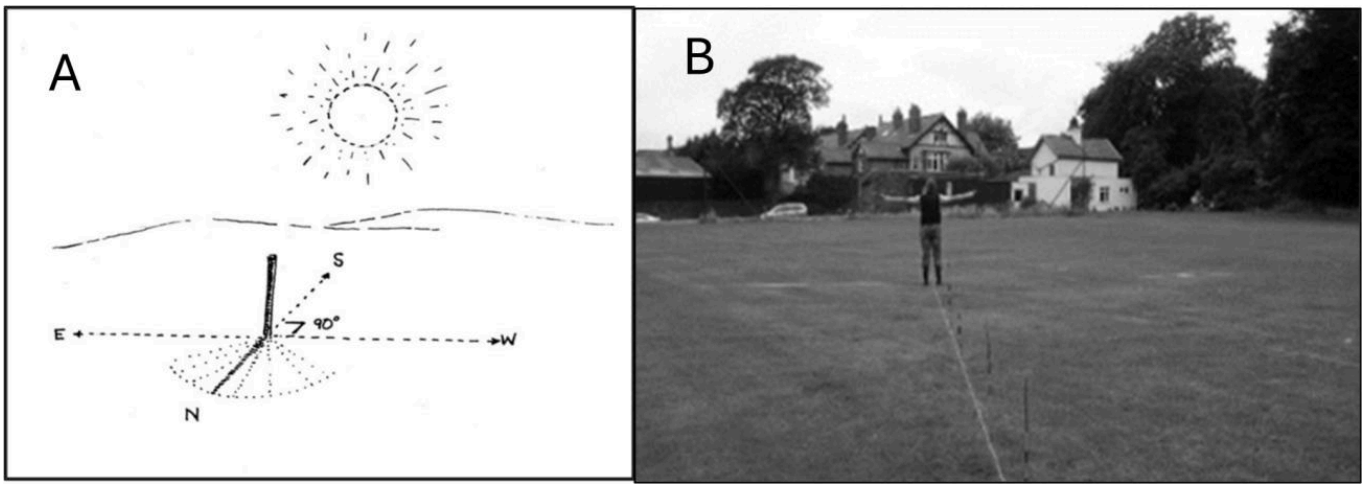

FIG 3AB. MY EXPERIMENTAL METHOD FOR ACHIEVING ORIENTATION (AFTER HILL,2024).

FIG 4. NESSHENGE IN 2008, MODERN TOOLS WERE USED TO DIG THE DITCHES AND RAISE THE BANKS (AFTER HILL 2009A).

FIG 5. NESSHENGE DURING THE WINTER SOLSTICE SUNSET (21ST DECEMBER). PHOTO BY AUTHOR

FIG 6. NESSHENGE IN 2008. THE DITCHES FILLED WITH RAIN WATER (AFTER HILL 2009A).

FIG 7. NESSHENGE TODAY (2024 AD). THE SOUTH ENTRANCE WITH ADJACENT FLOODED DITCHES. PHOTO BY AUTHOR.