Article

Temporal Frankensteins and Legacy Images

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Abstract: Digital images are produced by humans and autonomous devices everywhere and, increasingly, 'everywhen'. Legacy image data, like Mary Shelley's infamous monster, can be stitched together as either smooth and eloquent, or jagged and abominable, supplementary combinations from various times to create a thought-provoking and/or repulsive Frankensteinian assemblage composed, like most archaeological assemblages, of messy temporal components combining, as Gavin Lucas sums it up, as "a mixture of things from different times and with different life histories but which co-exist here and now". In this paper, we take a subversive *Virtual Art/Archaeology* approach, adopting Jacques Derrida's notion of the 'supplement', to explore the temporality of archaeological legacy images, introducing the concept of *timesheds* or temporal brackets within aggregated images. The focus of this temporally blurred, and time-glitched, study is the World Heritage Site of the Neolithic to Common Era henge monument of Avebury, UK (United Kingdom).

1. Introduction

Time can be a slippery thing. In 1940, Paul Nash sent a New Year's card to fellow artist Henry Moore with one of his photographs of an Avebury stone stuck on it. Redirected after the fact, it ended up on the wall of Tate Britain for the Paul Nash exhibition in 2016 (accession record is: *New Year Card for Henry and Irina Moore 1940*; Collage on card 24.1 × 17.5; Tate Library and Archive; TGA.8416/2/67). Derrida [1] describes the 'postal effect', the courier, misdirection, digging backwards, as Socrates taking dictation from Plato [2]. This postal effect is amplified exponentially with shared digital images in our networked world.

Digital images are produced by humans and autonomous devices everywhere and, increasingly, 'everywhen'. In addition to the amorphous phenomenon of "masses of images" [3], we are also witnesses to the denser, concentrated, phenomenon called "the mass image". Any internet search of a popular archaeological or heritage site (e.g., Angkor Wat, Great Zimbabwe, Machu Picchu, or Stonehenge) will result in "an aggregate portrait tending towards a total image . . . extending in time (in spring; at dawn; in 1945)" [4]. In other words, aggregate or mass images are complex, composite, multitemporal data visualisations, and therefore shot through with legacy data.

Attempting to collect and collate miscellaneous and fragmentary memories (i.e., legacy data) in the form of recorded images is nothing new. Consider, for example, the audacious bricolages created by André Malraux and Aby Warburg in their respective *Musée Imaginaire* (or *museum without walls*) [5] and *Mnemosyne* (or *atlas of modern memory*) projects [6]. Gérard Franceschi, Malraux's photographer, was later commissioned to tour Scandinavia and Europe photographing ancient, Romanesque, Scandinavian and Gothic works for The Scandinavian Institute of Comparative Vandalism (SICV). SICV

was founded in 1961 by Danish artist Asger Jorn and archaeologist Peter Glob. Their project *10,000 Years of Nordic Folk Art* (10,000 års nordisk folkekunst) was never published, but the archive of 26,000 photographs was revisited by the SICV, whose experiments in scanning, skimming, indexing, scale-invariant feature transformation (SIFT) and object recognition mobilise the archive in curious, computational, and agential ways (e.g., http://sicv.activearchives.org/features/05_collage.html accessed on 4 January 2022) [7].

What is new, however, is unprecedented consumer access to sophisticated and sharable imaging technologies with immense potential to be mashed up and repurposed in highly creative, non-traditional ways in cultural heritage scenarios we can only guess at [8–11]. Unabashed, today's crowdsourced images are said to be "democratising the digital reproduction of cultural heritage via 'mass photogrammetry', by providing approaches to digitise objects from cultural heritage collections housed in museums or private spaces using devices and photogrammetry techniques accessible to the public" [12]. Peters [13], for example, demonstrates the approach by building a 3D model of the Parthenon marbles housed in the British Museum using a small sample of images downloaded from Facebook. A growing number of commentators suggest that photogrammetric models derived from even modest crowdsourced image collections can be used for reconstruction of destroyed, overused, or inaccessible, sites and monuments [13–19].

In providing detailed documentation for analysis, monitoring, and cultural heritage management purposes, these archives are also claimed to provide a form of 'preservation by record'. While this is debatable, an established commercial and pedagogical extension of these models is the production of physical facsimiles in the form of surrogate cultural heritage sites, souvenirs for tourists, and teaching aids in educational collections. The models derived from (mass) photogrammetry can certainly (re)present and provide virtual access to the recorded or (re)constructed heritage. Indeed, such 3D (re)constructions have been promoted as supporting the development of so-called 'second chance tourism', in which augmented, virtual, and mixed media are enlisted to enable access to places that are no longer present or accessible. As Bec and colleagues note: "In addition to the potential development of a recreated 'destination', tourists and local people can engage by sharing personal and historical photos. For example, Project Mosul is using tourist photographs and video, *and archival documents and images*, to recreate lost artefacts" ([20], emphasis added). This latter example also sits more comfortably under the umbrella of retrospective photogrammetry [18,19,21] and, considerably less comfortably, in the shade of the associated emerging discipline of forensic architecture [22]. The crucial point to note here is that historic photographs and video frames can be digitised and converted into digital images, which can then be merged and repurposed with comparable images from other times. Scanning any photograph, or video frame, creates a digital version encoded in digital format that can be added to a digital archive without fundamentally altering the content. However, the digital version of the image is not inert. It can now be activated, and put to new uses, through digitalised processes to which the prototype artefact was not amenable. Digitalisation also enables images from various times, scales, and resolutions, based on different technologies, to mingle and morph, and create not only improper materialities [23,24], but also improper temporalities. In short, they become 'infinitely revisable' [25].

Science scholar Emma Frow discusses the growing debate around the untrustworthiness of digital images in scientific publications. While the shift from drawing to photography was regarded as producing more trustworthy images, by contrast, the shift from analogue to digital photography has been considered as less trustworthy [26]. This is because digital images can be digitally enhanced or manipulated and are thus seen as a threat to objectivity and scientific integrity. Similar debates around the epistemological value and status of digital images can be observed in the archaeological literature [27]. In our discussion of aggregate images, we recognise that archaeological digital images are often recruited as factual evidence; yet our concern is to question comfortable notions of 'truth' and 'fidelity' in relation to archaeological digital images. When we are dealing with

images that embody multiple temporalities, establishing the factual basis of a single image event not only becomes problematic, but potentially pointless.

In this paper, we adopt a collaborative, critical, diffractive, experimental, and disruptive *Art/Archaeology approach* to the phenomenon of the mass/crowdsourced image as the basis of teleologically flawed "weak surrogates" claiming to have captured and neatly fixed reality in "digital aspic" ([24], p. 150). Art/archaeology, as conceived by Doug Bailey [28–30], aims to disarticulate, repurpose and disrupt "artefacts from their pasts and to release them into the contested dynamics of the present, through the making of new creative works, not traditionally seen as historic or archaeological in form, display or intention" ([30], p. 700). Importantly, "Rather than producing institutionally safe narratives conventionally certified as truth, archaeologists should follow the lead of artists who use the past as a source of materials to be reconfigured in new ways to help people see in new ways" ([30], p. 691). This includes archaeologists trying "to challenge their own practice-based research creatively" ([31], p. 121, original emphasis) or, put another way, those applying their creative imagination [32,33].

In accord with Tracy Ireland and Tessa Bell, we want to challenge "the transcendent authority of the original material objects" encapsulated in such models ([24], p. 149). In doing so, we will not only explore the multiple materialities, including 'improper' materialities [23] of crowdsourced (or mass) photogrammetric models, but also the multiple different, supplementary, and improper, temporalities that can be etched on to them, and then repeated unchallenged as interstitial pluritemporal elements in the physical (re-)expressions of these improper but generative aggregated composite 3D models. We also embrace the concepts of *synesthetic catachresis* and improper digital materialities. As Ashley Scarlett summarises, to "speak of digital matter through synesthetic catachresis is to experience simultaneously its presence and effect, its absence or un-representability, and its conceptual stabilization. Rather than developing an absolute account of its existence and characteristics, catachrestic synesthesia enables a variable approach to digital materiality" ([23], p. 112).

Circling back to our title, in Mary Shelley's (1818) classic, the monster created by Dr Frankenstein appears as an improper materialisation par excellence—an alterity whose dubious materiality and manufacture is only hinted at in the novel and ambiguously illustrated in later film interpretations. In the novel, Frankenstein's monster is a melancholic bricolage of conjoined contemporaneous body parts galvanised into life by some dark technologies of vitalism and electricity. The literary version of the monster in the novel reflects thoughtfully and eloquently about his own being and meaning. In stark contrast, the derivative movie-star monster is portrayed as a mindless, crudely stitched-together, mute, and rampaging abomination. Legacy image data, like Frankenstein's monster, can also be stitched together as either smooth and eloquent, or jagged and abominable, supplementary combinations from separate times to create a thought-provoking and/or repulsive assemblage, composed of messy temporal components, combining "a mixture of things from different times and with different life histories but which co-exist here and now" ([34], p. 142).

2. Archaeology and Archaeological Images in the Making

Archaeological traces embedded in the wider landscape are not static remnants waiting to be (re)discovered and (re)composed. Rather, they are perpetually in motion in a fluid, if viscous, process of becoming [35]. This makes both assured archaeological 'features' and less definite 'anomalies' pluritemporal, meaning that they can (re)appear and disappear for very variable amounts of time depending on local environmental circumstances. Depending on where, how, and when you try to (re)cognise them, many features can withdraw quickly. Some gradually morph into more-or-less defined traces. Yet others simply pop up whole and recognisable. For example, when the landscape is eroded (e.g., by wind and water, ploughing, mining and landslides) formerly buried archaeology can be exposed. Commensurately, the same processes that cause erosion in one place can cause build-up and burial elsewhere by shifting deposits to a new location. Once clear surfaces can

become obscured by these build-ups, but also by building and road works, and vegetation, particularly forestation. Equally, both the scouring action of erosion and new plant growth can reveal previously buried landscapes (e.g., exposed ruins, and other features such soil and crop marks).

Buried archaeological deposits rarely conform to neat palimpsests, with each new independent assemblage superimposed in new, supplementary, discrete, and tidy replacement archaeological horizons [36]. Site formation processes are not often so accommodating. Multitemporal archaeological features are usually interlaced and messy. They often either accrete to, or cut through, one another, and their contents can be quite mobile. Stratigraphically lower deposits can be leached through, and supplemented, by material washed down from overlying deposits. Conversely, components of more deeply buried contexts can percolate up and supplement later superimposed deposits through bioturbators such as animal activity. In certain, and often unpredictable, circumstances, buried archaeological features can reveal themselves in surface scatters of artefacts and more distinctive "acheiropoietic" ([37], pp. 172–173) or "autographic" surface traces [38], so-called "planetary diagrams" [39] or maculae, in the form of soil, crop and parch marks, and shadow sites, archaeological "revenants in the landscape" ([37], Chapter 4). The unpredictability of supplementary archaeological autoexpressions arises due to a complex range of dynamic factors, including the depth and composition of the deposits, seasonal and local weather and light conditions, viewpoint, and equally the (cross)modes of remote sensing used to prospect them (whether human or machine enhanced). Maculae are not stable entities. On the contrary, they are very relational. Unique features appear under different circumstances and in various combinations and fluctuating degrees of definition. Changing any of these environmental factors can affect the form, extent, and the duration, of any auto expression. For instance, drought years often produce more, persistent, and detailed, crop marks. In short, these uncanny, spontaneous traces are fragmentary, temporary, and very mutable phenological indicators. The crucial point here is that features from distinct temporal horizons can emerge together as an entangled multi-period anomaly etched into the earth's surface or the vegetation covering the earth's surface. This vegetation is not only sensitive to buried features, but is also prone (at least in Wessex, United Kingdom) to the interventions of 'crop artists' [40]. Similarly, despite appearance to the contrary, robust static monuments and other upstanding archaeology are also, albeit slowly, in motion [35].

3. Avebury Again and Again

Consider our case study, the UNESCO World Heritage Site of Avebury, whose apparent timelessness provides a classic example of "a material memory cycle over which artifacts are altered, destroyed, buried and perhaps (re)discovered, and then preserved as objects bearing witness to the past, and then may be destroyed and 'forgotten' all over again" ([41], p. 191, original emphasis). In essence, it remains a site of "existential relatedness" [42]. Avebury is a later Neolithic complex that was first constructed between c. 3000 and 2350 BCE ([43], pp. 42–43). The henge earthworks and stone circle do not stand in isolation but developed in a Neolithic landscape with a long history dating back to the 4th millennium BCE ([43], pp. 23–38); the very fabric of the Avebury site was composed of elements with a storied past [44]. The Avebury site was (re)discovered by the antiquary John Aubrey in 1649; recorded in detail by William Stukeley in the 1720s; and restored in the 1930s to its perceived former glory by the marmalade magnate and playboy Alexander Keiller ([43], pp. 1–2). In the intervening periods we can detect countless other interventions (or supplements) to the complex.

How are we to consider these ongoing interventions? Gillings and Pollard ([43], p. 40) argue that Avebury is not a classic palimpsest created by processes of erasure and (re)inscription. Avebury is arrived at more through gradual processes of "becoming" ([43] p. 40). There is no fixed original or final Avebury to be reclaimed. The landscape of Avebury shimmers over time as elements wriggle in and out of the temporal foreground. Individual great sarsen stones were dragged to Avebury and erected in the Neolithic period [44]. From the Medieval period until

recent times, individual megaliths were knocked down; some were broken up and destroyed [45]. Later, some of them were repaired and re-erected at various times, particularly during Keiller's great 'renovation' of the site in the 1930s. Many others are still buried or otherwise 'missing'. The earthworks were also remodelled extensively. For example, "Between the sixteenth and nineteenth centuries the earthworks around the entrance causeways were subject to a variety of disturbances, ranging from quarrying and construction to road remodelling and tree planting" ([43], p. 10). There is no *final form* to the site; "Avebury is a site in a constant state of flux and negotiation" ([43], p. 2).

We agree with Gillings and Pollard's assessment of the complex. Avebury offers a useful example of how archaeological sites undergo change, and of archaeologists' increasing realisation that this change need not be sequential and layered. Instead, archaeologists are increasingly aware that the archaeological sites may be pluritemporal [34,41,46]. This realisation offers challenges to the traditional approach to sequential change in archaeology [47], but it also offers new potentials for how we imagine the materiality of archaeological sites. As Gavin Lucas has recently noted, "ultimately, it is through recognizing the materiality of time—that things make time rather than exist in it- that this tension between physical and felt time finally dissolves" ([34], p. 41). Of particular interest to us here is how the pluritemporality of archaeological sites might relate to the pluritemporality of archaeological modes of documentation. To what extent do legacy data images make time?

That archaeological sites (monuments, features, and anomalies) are constantly in motion has profound implications for the legacy image data that we obtain from them. Archaeology as a discipline started to emerge in the post medieval period through the activities of antiquaries. Antiquarians measured plans and elevations, and other scaled drawings and maps appear from the sixteenth century onwards. All are forms of rare images containing useful legacy data, which are particularly valuable for the metric data they retain for those previous, radically different (re)configurations of sites and monuments, especially those now destroyed. However, it is really with the advent of photography that archaeological and cultural heritage sites and monuments really began to be systematically (re)captured in countless pluritemporal photographs, recorded from the mid-nineteenth century onwards [48].

Images, like all legacy data, create inertia by establishing baselines and anchor points to which all subsequent related data sets can be measured and compared. They spawn format conventions and set standards which then get subsumed in genealogies of looking—and evolve into the 'right way' and 'best time' to frame and capture the essence of things correctly. The observer becomes enslaved in the technologies of observation [49], mere functionaries [50] following standardised procedures. However, sometimes these things, which are continually being supplemented in combination with innovative technologies of observation, have a way of upsetting the observer viewpoint, initiating a fundamental reset of our paradigms and timelines of perception. Flusser ([50], p. 156) characterises these kinds of images as *dialogic*. They become witnesses to, as well as witnessed by, these changing technologies of the image. As we showed above, archaeology has a long history of witnessing and, crucially here, *supplementing* ancient monuments and landscapes, especially in modern-day Wessex and Neolithic Avebury. A 'supplement' in Jacques Derrida's [51] terms is simultaneously something that completes another thing, but also something that may replace it, and play the role of substitute for it; and therefore, be a temporal threat for it.

Improper temporalities: time-glitching the stones at Avebury, 2022 (Figure 1) collages a 17th C etching and a late 19th C photograph on a 21st C photogrammetric model of Avebury compiled from photographs donated by Steve Marshall. *Aggregate Portrait: Legend Tripping, Devil's Chair, 2022* (Figure 2), by contrast, is an aggregate proto-timeshed image interlacing portraits of visitors posing *at various times* in front of the iconic *Devil's Chair* (stone #1)—which, incidentally, is also featured in Figure 1. Figures 1 and 2 respectively demonstrate substitution and accretion as telematic, compositional methods. These are still images of

digital objects. Digital objects are better understood as a web of interactions and relations rather than as finite objects and require much more theorising [52–55].
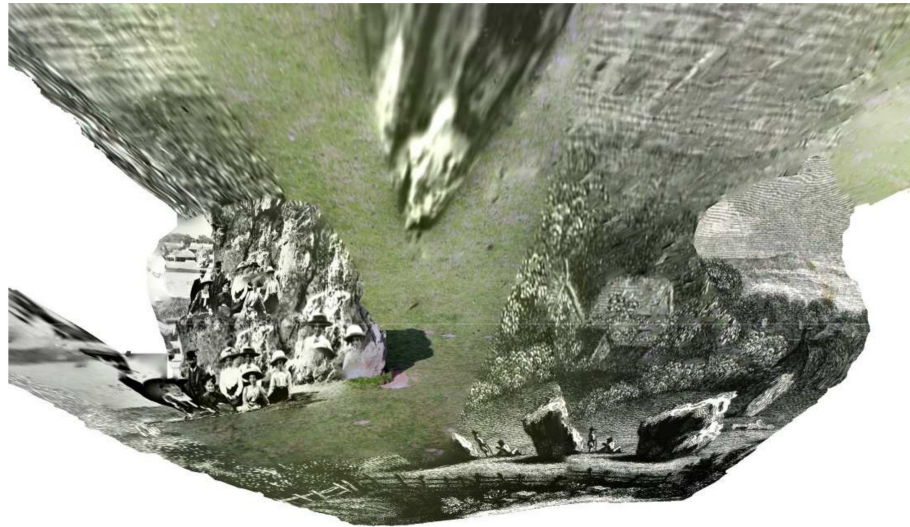

Figure 1. *Improper temporalities: time-glitching the stones at Avebury, 2022.* ('Supplementary' images inserted into Agisoft Metashape project, re-compiling part of the south circle derived from images Courtesy of Steve Marshall).

Figure 2. *Aggregate Portrait: Legend Tripping, Devil's Chair, 2022.* Prototype composite timeshed image: focus-stacked, crowd-sourced images of visitors posing at Avebury stone 1, the *Devil's Chair*.

The digital images in Figures 1–3 confirm that there is no fixed, original, or final site or monument. These 'portraits' were taken with the *Devil's Chair*, at separate times, by different people, using various instruments, with individual affordances. They remind us, forcefully, of what Derrida ([51], p. 313) calls the "supplement of (at) the origin", meaning, paradoxically in archaeological contexts, that for the *Devil's Chair* to remain monumental (and by extension

the entire complex), it must be available to be (re)visited, (re)experienced, (re)recorded and (re)presented, or fall short of itself. It must be (re)iterable and therefore requires a supplement; the supplement is both accretion and substitution, but it is "neither a presence nor an absence" ([51], p. 214). A series of supplements can be chained together backwards to the earliest identifiable legacy data. If one wishes to go back from any one supplement to the source, "one must recognize that there is also a supplement at the source" ([51], p. 304). Put simply, the source is never complete. From the outset, there has always been something more that has yet to happen. For example, all the stones may have been erected, but the next celestial event to activate them is always pending. In other words, "supplementarity is a necessarily indefinite process" ([51], p. 281). The implication for us is that legacy data only gain agency when supplemented. The concept of the supplement enables us to accommodate continuity and change, to pivot and balance multiple perspectives, at different scales, spanning various temporalities, and embracing radically different materialities.
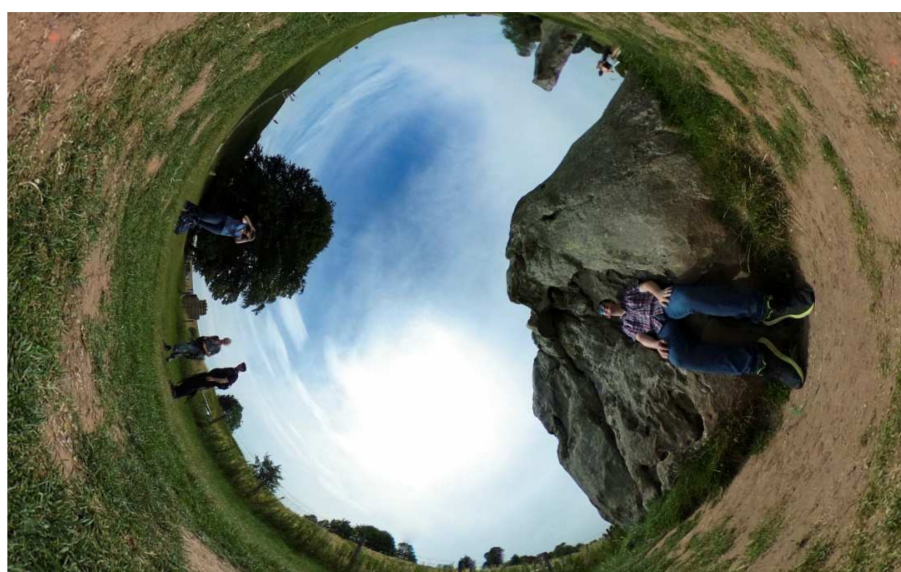
Figure 3. 360° Portrait of the *Devil's Chair*, Avebury (2018).

4. Adding Temporality back into Selected Sarsens

From the end of the 1990s, several scholars moved beyond the finality apparently conveyed by the 'definitive plans' of Avebury and the view that every generation, borrowing a phrase from Jacquetta Hawkes [56], has the Avebury it deserves. Perhaps inspired by William Stukeley's drawings, which show perspectives occupied by interested visitors sharing the intersubjective space of Avebury ([57], p. 366), the last two decades of research is readdressing the three-dimensionality and architectural complexity of the monument. One particularly influential theoretical approach was through the medium of phenomenological analysis to develop more encountered and negotiated perspectives of the situated body within the monument. Various scholars have turned to the digital, and particularly to the vehicle of Virtual Reality modelling [58] to develop a virtual 'first-person approach' [59] to exploring the monument. This virtual approach continues to be fruitfully elaborated [60,61].

We will also adopt a virtual approach to (re)negotiating the henge complex as it persists today from multiple, multitemporal—sometimes inter- and intra-generational third-person perspectives. We attempt, for instance, to account for different interlaced biographies of specific stones that have at various times been standing, recumbent, toppling and broken sarsens. Gavin Lucas reminded us of the well-known 'folded handkerchief' metaphor to describe the nature of time. Time in this analogy may be considered discrete and successional in the accumulated neat layers of the folded handkerchief. By contrast, when the handkerchief is 'scrunched,' time becomes messy and any two points of the cloth can touch one another ([34], p. 142). Here, we favour the scrunched version of time. We ask

what we might see and learn if we adjusted the aperture of our lens to control not only the depth of field but also the *depth of time*?

Embracing a messy aggregate or mass image approach, using legacy images, we create what we term *timeshed* images in which different Avebury image timelines blur one another. We introduce this neologism—'timeshed'—as a conceptual alternative to the more familiar concept of 'viewshed.' Whereas a viewshed is generally understood as a computer-generated map or model of the view of an area from a specific vantage point at a specific time, the timeshed is a computer-generated map or model that reveals how that view of an area or place has changed within specific temporal brackets. For instance, the view of the so-called *Barber Stone* in the Late Neolithic period, when it was first erected, would look radically different to the equivalent view taken in the medieval period, after the stone was pulled down, and against also the much later equivalent view of the stone re-erected and re-installed in the 1930s. All three 'views' that once existed, albeit within the extremely broad temporal brackets, are true. However, envisaging the different views as overlapping, or interlaced, timesheds enables us to appreciate better that the seemingly static and immobile monument of the current era is a dynamic assemblage, and the product of a significant amount of movement and change. We will explore this time-glitching perspective of our conceptual timesheds further with reference to some individual sarsens with notable supplements before pulling back to reconsider the complex more broadly.

Several sarsens have been defaced at various times. A number received cosmetic scars in recent years, such as disfigurement by painted 'satanic' or 'pagan' symbols. Others were much more brutally handled, and even broken into pieces long ago. Parts of some of these mistreated and butchered stones still haunt the village pub and field walls around Avebury. This splitting of the sarsen into building material would seem to preclude their re-making. Amazingly, severed pieces from two different sarsens were recovered and reattached by Keiller's workers. Keiller's retrieval and assembly of dismembered parts produced two Frankensteined bodies. (Franken) stones 24 and 42 are partially re-fitted, adorned with seams, but still jagged and incomplete. Their monstrously broken tooth-like profiles, recorded photographically for posterity, adorn the comprehensive guidebooks to the monument ([62], pp. 65–68). However, we must recognise that the process of recording is also a technology of separation, splitting off image from site, magnifying, re-framing and over-producing exponentially. As with the collection and collation of fragmentary secondary material worked through in Walter Benjamin's *Arcades* project [63], or in Aby Warburg's *Mnemosyne* atlas [6], such accumulated, reiterative picture libraries point to new compositional potentials. A bricolage of fragmentary images may be pieced together photogrammetrically through pixel-matching and tie-points, but also through modes of parataxis, kitchen-knife collage, montage and, latterly, the superimpositions of augmented reality [64]. Beyond this, the proliferation, surge, accumulation, and deposition of digital images as 'image dump' produces its own midden for archaeological investigation.

Stone 4, a member of the outer circle, has a chequered history, weaving in and out of the monument's evolving narratives. It is one of a mysterious cohort of sarsens that were 'disappeared'. It was pulled down into, buried, and thereby concealed in, a grave, cut to accommodate its entire body shape ([65], p. 177; [66], p. 186). In other words, the shape of the grave cut echoes both the exposed part standing proud above ground surface and that embedded underground in its stone socket hole before it was toppled (Figure 4). Rediscovered, resurrected, and reset in its supposed earlier undisturbed position, Alexander Keiller supplied its designation as 'stone 4' in the 1930s. Despite exhibiting many tonnes of rock set in concrete, this stone is remarkable for also becoming a weightless, but hyperreal, simulacrum that was launched into hyperspace "to be examined, manipulated and visually devoured" ([66], p. 190). Despite now being "open to continual unbounded interpretation and negotiation", Gillings and Pollard were quite dissatisfied with the overall materiality of their empty digital skeuomorph of the stone they had nicknamed "the fridge" (Pollard pers.comm.). For now, stone 4 (aka 'the fridge') is floating, decontextualised, in cyberspace, tethered only by a flimsy URL, awaiting unrestrained cloning, reproduction, and mutation,

around the internet universe, stemming from an early act of "digital colonization" [52,54]. Many instances of the stone 4 model may have been downloaded and repurposed in places and times unknown. Regardless, at some point the tethering to the URL was snapped and, like the monster on the iceberg at the start of Shelley's classic novel, this digital vessel is now adrift on featureless currents.
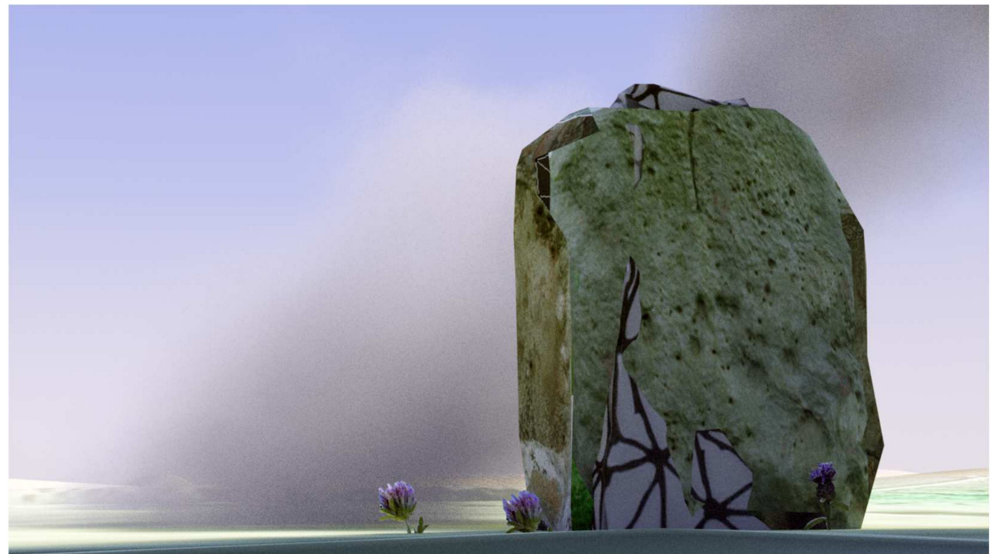

Figure 4. Stone 4 as uncovered by Alexander Keiller [65]. Watercolour and ink on paper after Keiller's photograph, 2022.

The digital vessel was itself sutured together, a leaky structure emerging through the agency of brightly coloured tiddlywinks, triangulation, tie-points, vertices, and a point cloud, into a virtual social life, taking shape and dispersing (Figures 5 and 6). The act of digitisation creates structural homologies [67] between the different stones, allowing new configurations and hybridities that rely on mutability rather than conclusion. Instead of resting as objects of analysis, the stones seed new forms, a digital phenology or life cycle. These inherent mutabilities, synesthetic catachresis and improper digital materialities, mean that the digital image files are wildly susceptible to new influences and generative processes, and are friends to digital depositions through the alternative materialising agencies of (3D) printers and plotters (Figure 7).

In glaring contrast to the tranquil sight of an upright stone 4, covered by tiddly-winks, we can observe an extraordinary moving ripple in the scrunched temporal topology at Avebury when the 1930s Keiller encountered the skeleton of the so-called barber-surgeon emerging out of the medieval horizon from underneath a toppled Late Neolithic sarsen. The scene, with the accompanying narrative of the stone falling on the hapless man, as he helped pull it down, once seen is indelible. Regardless of its original upright Late Neolithic physicality, stone 9—the *Barber Stone*—is also undeniably Late Medieval and recumbent. Both images are true or have veracity. Equally memorable, and valid, are those preserved images recording this massive stone—a huge toothlike presence—floating above a stone socket awaiting re-implantation, held suspended by Keiller's ropes and pulleys (Smith, 1965). All these configurations—upright, listing, recumbent, buried, suspended—are legible in the legacy data. Viewed via a *timeshed*, with suitable time-depth, bracketed plus or minus several generation stops, these pluritemporal events are still detectable, persisting in legacy images, and can now co-exist. In an analogous manner, we can bring together, align, and merge physically broken stones digitally. We can (re)present them phygitally—that is, both physically and digitally (e.g., Figures 8–11) [53,54]—and reimagine the various major temporal configurations of stone 9 interlaced within a *timeshed*. Figure 11

shows a materialised *timeshed* in which both the recumbent and the re-erected instantiations of stone 9 are temporally conjoined through synesthetic catachresis and improper digital materialisation (i.e., 3D printed in PLA).

Figure 5. 3D digitising Stone 4 aka 'the fridge' (photo courtesy of Mark Gillings).

Figure 6. Tiddlywinks pieces carefully placed in the 1990s as distinctive colourful tie-points were logged so as to enable the digital stone 4 to be stitched back together (Photo Courtesy of Mark Gillings).

Figure 7. Reskinned, scarred materialisation of Stone 4 (32K VRML PhotoModeler file, [58]) and TIN paper model, inserted into LiDAR landscape (3D model created by Mark Walters in QGIS with the QGISthreeJS plugin, using freely available Environment Agency 1 metre DTM LiDAR data) with lockdown flowers, rendered in Blender, 2022.

Figure 8. The Barber stone (#9) resurrected in the digital, 2019. (Copyright The Authors CC BY-NC).
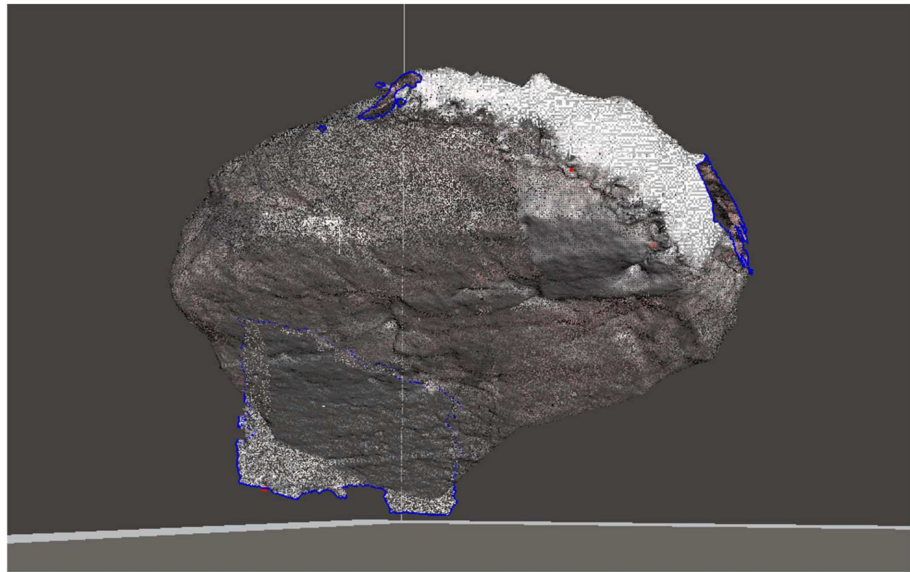
Figure 9. Barber stone being virtually toppled, 2022. (Copyright The Authors CC BY-NC).

Figure 10. Phygital Barber stone 2020 (Metashape and PLA, 70 mm × 50 mm ×15 mm). (Copyright The Authors CC BY-NC).

In 1933, before Keiller's 'reconstruction', artist Paul Nash photographed some of the standing Avebury stones. He captured the *genius loci* of each stone on a No.1A pocket Kodak series 2 camera. He called the stones 'sentinels' or 'personae'. These portraits were working material towards his 1935 painting, *Equivalents to the Megaliths*. The Tate Archive houses a black and white negative (TGA 7050PH/119) from 1933. This double exposure, by accident or with purpose, within the brief time scale of his walk, prints via silver nitrate two views of different orientation and scale into the same image, tipping the stone through its axis and providing another, infra-thin, materialisation of a *timeshed* (see https://tinyurl.com/mt26zbwp, accessed on 28 February 2022).
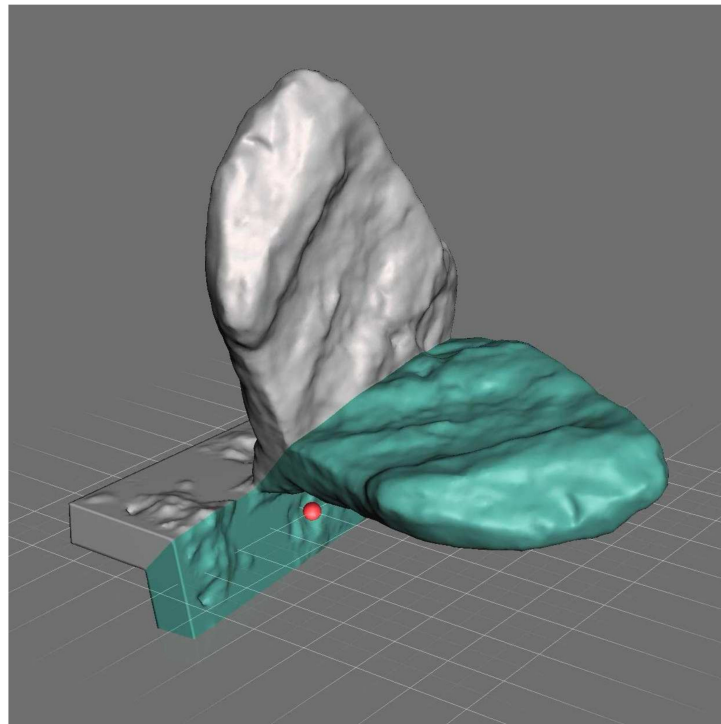
Figure 11. *Frankenstone 9*—Barber stone (re)modelled using recumbent and resurrected phygital timeshed, 2022. (Copyright The Authors CC BY-NC).

Derek Jarman's (1971) experimental 10-min film *A Journey to Avebury* is composed from spliced Super 8 shots of resting points, or vistas, during his walking journey through Wiltshire to the stones. It is a home-movie landscape entirely unpopulated by humans, lit through a heavy yellow filter. The camera is still. It neither pans nor zooms, but just lets the landscape fill the lens. The wind shifts the summer trees and cornfields. The materiality of the film is emphasised by bright blue scotoma flicking through, and staining, the frames—chemical artefacts of the analogue process. Jarman later reworked the footage into another film *In the Shadow of the Sun* (1980). Both Nash and Jarman reflect on aspects of Englishness through their mediatised journeys to Avebury, and their praxis and visions embed these aspects into broader cultural memory. *A Journey to Avebury*, in its sulphureous longing, seems to foreclose certain futures and prepare the ground for Jarman's dystopian *Jubilee* (1978) and *The Last of England* (1984).

In 1969, American artists Nancy Holt and Robert Smithson visited the UK, making a tour of rocks, quarries, and megaliths. Both artists were innovators in land-based practices. Holt's works often operate as locators within vast landscapes. For example, *Sun Tunnels*, 1973–1976, is a massive set of concrete pipes oriented towards the solstices in the Great Basin Desert of Utah. The landscape of Avebury is clearly referenced in Smithson's *Broken Circle/Spiral Hill* made in 1970, incidentally the only earthwork Smithson made outside of the USA. His most famous work, *Spiral Jetty*, was also made in 1970 and continues to transform, flood, and re-emerge. Smithson's writing around entropy, sedimentations of the mind, geologic and industrial formations, and aerial art, alongside his exploration of the topographies of art practice, continue to be relevant in surprising ways. Key to his positioning is his theory of Site and Nonsite (Table 1) [68]. His distinctions between the actual Site and the Nonsite (a representation of the site, often in a gallery context, through maps, photographs, rock piles, and other *containers* such as an indoor earthwork) might draw some parallels with the new sense of metaphor which articulates the relation between Avebury and its legacy data or many Nonsites extrapolated and displaced from the phenomenological experience of site into time-glitched legacy images, paintings, and installations.

**Table 1.** A comparison of Smithson's [68] notion of Site and Nonsite.

Site	*Nonsite*
open limits	*closed limits*
A series of points	*An array of matter*
Outer Coordinates	*Inner Coordinates*
Subtraction	*Addition*
Indeterminate Certainty	*Determinate uncertainty*
Scattered Information	*Contained information*
Reflection	*Mirror*
Edge	*Center*
Some Place (physical)	*No place (abstract)*
Many	*One*

Many other temporal–ontological transformations abound in the phygital and can occur in very rapid succession. Consider Louisa Minkin's *Plastic Print derived from aggregated images of the Devil's Chair, Avebury* created in 2015 (Figure 12 and reworked in Figure 13). For this piece, Minkin aggregated images taken by tourists adopting the same pose at this iconic megalith over a narrow timeshed of several recent years (also used for Figure 2) to produce a 3D material "souvenir object of uncertain spatio-temporal status" ([69], pp. 122–123). This disturbing temporal-Frankenstein-like simulacrum emphasizes the fact that every visitor brings a new supplement to Avebury. The monument does not exist in a void; the intersubjective spaces surrounding the sarsens are continually being renewed.
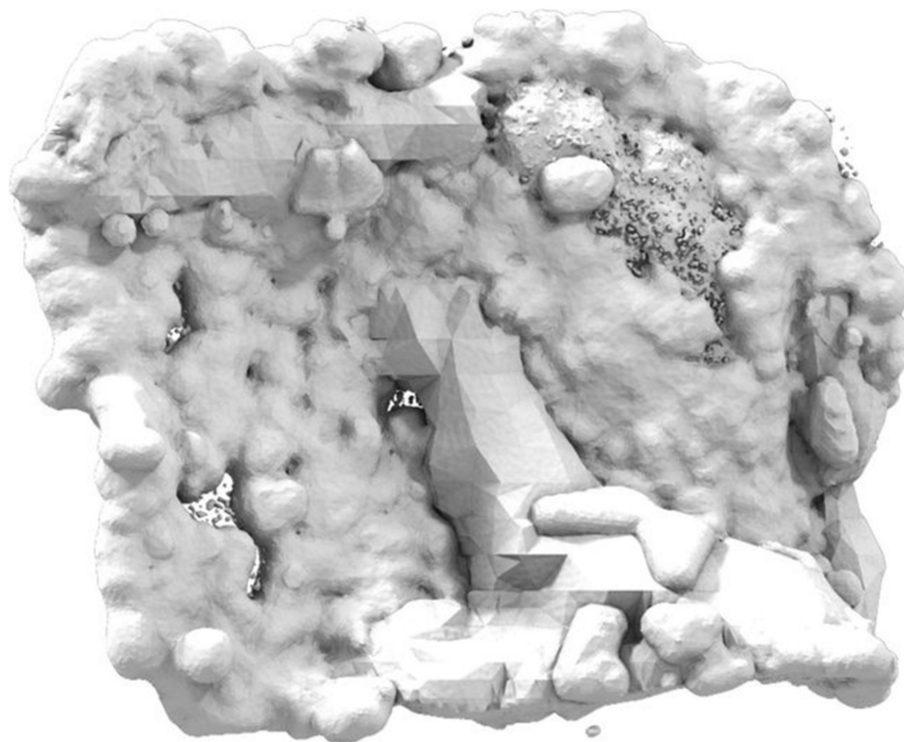
Figure 12. *Nylon Print derived from aggregated images of the Devil's Chair, Avebury* (Louisa Minkin [69]) http://louisaminkin.com/glitch/frankensteined.html, accessed on 28 February 2022.
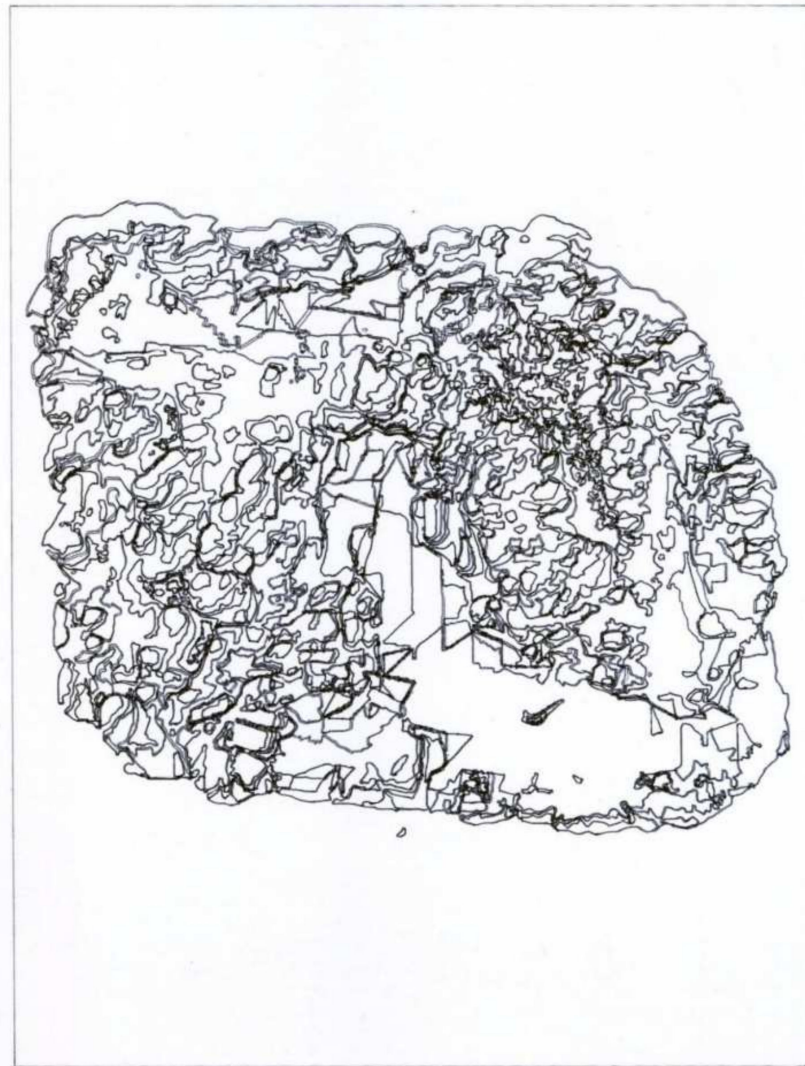
Figure 13. *Stone 1 Revisited* (Louisa Minkin, Plotter drawing, 2022).

5. Supplementing the Stones

The story of the barber-surgeon is replayed as a pivotal event in the 1977 BBC TV 'cult' series *Children of the Stones*, set in a fictional Avebury, called Milbury. Filmed among the stones over the parched summer of 1976, the series is a fever dream of folk horror, reputedly the scariest programme ever made for children. A generation of young people (including several of the present authors) were imprinted with broadcast images of 1970s Avebury in its unique configuration of ancient lithics and stratified contemporary community. Avebury operates both as a character itself and as a scene of scientific and occult experiments and social dis-ease. The legacy of *Children of the Stones*, and its popularity, persists on streaming platforms, in the surrogate form of community-uploaded home VHS footage, parsed through online codecs and rapidly deprecated aspect ratios. Happy Days.

The opening sequence of the series is a circling aerial view of the village that scorching summer. Downloaded, exported as frames, and compiled spatially through the time machine of Structure from Motion (SfM) software, we can build a navigable 3D version of 1976 Avebury seen in the mind's eye (Figure 14). In more recent times, Google continues to supplement its streams of car-based images to the bulging stack of terrestrial images which could also contribute to any future SfM project at Avebury (Figure 15).
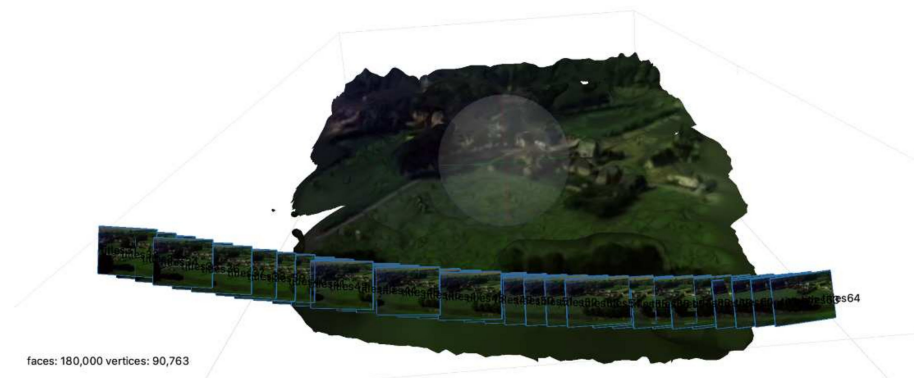
Figure 14. *Children of the Stones* 1977 opening sequence exported as stills and compiled in Metashape. (Copyright The Authors CC BY-NC).

Figure 15. Screenshot: An ongoing flow of legacy images. A frame from a relentless stream of images taken from car mounted camera systems, this one travelling through Avebury in 2009 and 2021 (Courtesy of GoogleStreet).

6. Supplementary (Air) Space

Aerial photography eventually caught up with, and then superseded, Stukeley's oblique pseudo-aerial views as the dominant form of distanced discourse at Avebury. The first known published aerial photograph of Avebury, taken before Keiller's 'improvements', we believe is 'Plate XXXVI AVEBURY' in Crawford and Keiller's landmark book, *Wessex from the Air* ([70], facing p. 210). Since then, aerial survey has become a mainstay of British archaeological prospection [71–74]. More recently, remote sensing (e.g., multi-spectral, hyperspectral and LiDAR) are producing prodigious volumes of digital images of archaeological landscapes at national and international scales, with associated challenges (inter alia, [75–77]).

Zylinska [78] reminds us that many images are derived from the cyborgic gaze of digital devices which have subsequently been assigned visual characteristics and presented in legacy formats that humans recognise as photographs. Digital images have more in common with spreadsheets than photographs and are thus equally manipulatable and infinitely revisable [25,79,80]. Dostie, for example, observes that Google "creates maps for us using satellite imagery that seems to never have clouds; this is because those images are mosaics of several images taken at different times, and the *best parts of them are stitched together* to create composite images you see on your computer or phone" ([80], pp. 181–182, emphasis added); in other words, they are timeshed building blocks. Rippled with multi- and pluritemporalities, these now contemporary images create a digital plough zone composed of mixed-up legacy (symbolic) data. Again, we can once more think of these datasets as 'temporal Frankensteins' [54], a composite, monstrous, cyborg assemblage derived from many

different sources, scales, angles, resolutions and, most crucially here, times. Nevertheless, as Huvila ([81], p. 54) reminds us, it can be very instructive to recognise both the risks and the benefits of adopting a monstrous gaze. We will try to adopt a monstrous, cyborgic, gaze to inform our analysis.

Today, many iconic artefacts, buildings, and their landscape settings—in addition to the attention they deserved from photographers—have been subjected to sustained cyborgic observation for several decades. Over that period, both the cyborgs, as well as the subjects of their sustained imaging, pursued a chain of dialogical changes, as new more advanced devices emerged almost daily. New instantiations, or versions, of the archaeological landscape are being generated at an ever-quickening pace. Avebury is not exempt from this process and due to its own iconic status, it invites even more supplements to accrete to it. Crop art of unknown provenance, generally referred to as *crop circles*, has cropped up several times within the Avebury World Heritage Site (WHS) landscape (Figures 16 and 17).
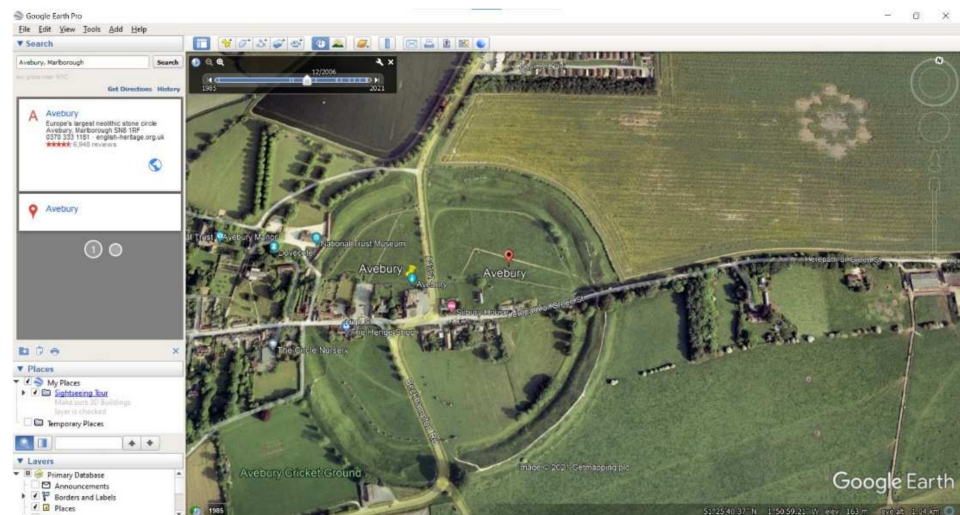
Figure 16. GoogleEarth (2022) Screenshot: Avebury World Heritage Site (WHS) with crop circle recorded December 2006. (Courtesy of GoogleEarth).
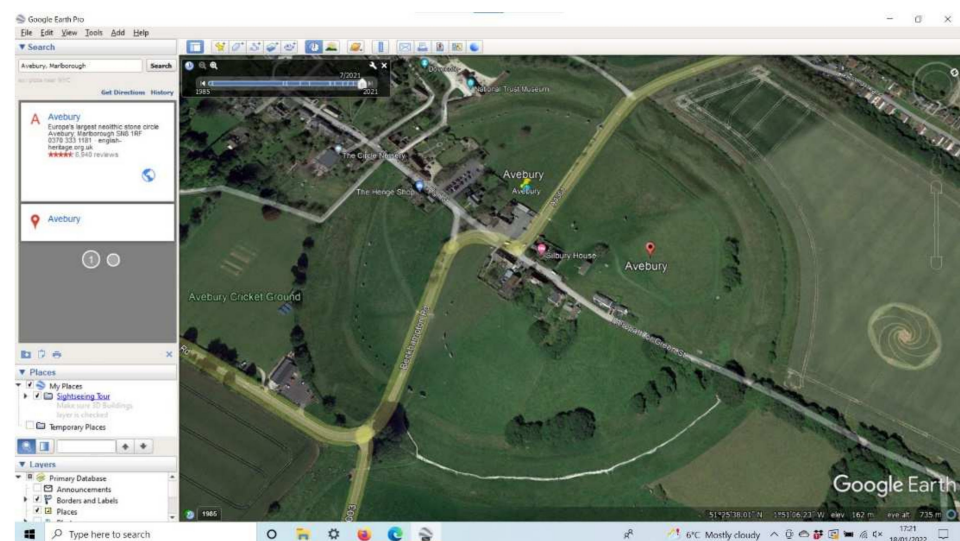
Figure 17. GoogleEarth (2022) Screenshot: Timeline-shifted view of Avebury WHS registering another unique crop circle, July 2021. (Accessed: 4 January 2022) (Courtesy of GoogleEarth).

Unlike crop or soil marks, 'crop circles' are not quite terrestrial and, despite counter claims, nor are they convincingly extra-terrestrial. Sometimes, they hover above the ground, supported on grain stalks decapitated by a *mower devil*. Mostly the grain plants have been toppled or otherwise collapsed. In either case, the result is often an extraordinarily intricate design of usually geometric marks, or scars, tattooed slightly above the landscape. Sometimes, crop marks are discoverable in LiDAR scans, at least until the stems are fully cut down or ploughed out. The ephemeral crop circle shown on a Google Maps timeline tracking Avebury (Figure 16) was, coincidentally, also captured in a contemporary LiDAR DSM scan (Figure 18). This distinctive crop circle mark, floating just above the landscape, can now be interlaced with supplementary images developed prior to, during, and after a short season of cosmic notoriety, that is until the crops are cut down. They represent another potential *timeshed supplement* to add to the overall Avebury WHS timeline. Avebury keeps moving on; additional supplements present themselves relentlessly.

Figure 18. Screenshot: DSM (Digital Surface Model) LiDAR image of Avebury, capturing the trace of a crop circle made in 2006 in the top right hand corner of this image (CC by 4.0 courtesy Houseprices.io https://houseprices.io/LiDAR/SU1072570382/3d accessed on 4 January 2022).

7. Discussion and Conclusions

This paper has focused on the supplementarity and the temporality of legacy images. Our case study for this analysis has been the site of Avebury, North Wiltshire, UK. Avebury is particularly apt for this analysis, as its most recent excavators, Mark Gillings and Josh Pollard, recognise that: "As a monument Avebury is fascinating in that it already encapsulates much of the hyperreal, from the regularity and artificiality of the area of the henge reconstructed in concrete, earth, and stone, by Keiller, to the geometric and symmetrical hypothetical reconstructions of the early antiquarians" ([58], pp. 147–148).

We also recognise that there are many instantiations of Avebury. Stones and people have come and gone. Certain, temporally circumscribed, Aveburys are more privileged than others—at least in the minds of archaeologists, cultural heritage managers, residents, and visitors. The late Neolithic for example. Nevertheless, all the other temporally distinctive Aveburys that emerged, and persisted, are equally real. All are 'true'. In a phygital nexus we can supplement them individually or compositely. They can produce a view which shows the stones as both slighted and resurrected. Both versions are 'true' but not normally pictured simultaneously in a *timeshed*.

To highlight the pluritemporal character of Avebury, in this paper we have visually explored and presented a series of supplementary Frankenstein monsters, alternating between crude and jagged to smooth and airbrushed in their rendering. These renderings

underline the 'scrunched handkerchief' analogy of time discussed above. This assemblage is Neolithic, Bronze Age, Iron Age, Medieval and contemporary.

The metaphor of the scrunched handkerchief prompts us to consider that time is messy, but still coordinated; while different points may touch, the fact that this is possible is determined by the physicality of the handkerchief. In a similar sense, we recognise that there can be no legacy data without tie points. Failure to line up our physical tie points pushes at the epistemic threshold between artefact and fact.

As we have also highlighted, images are never 'innocent'; they carry genealogies of seeing [49,82]. Increasingly, we are witnessing the automation of archaeological digital imaging, and an explosion of social media images in archaeological settings, all being supplemented by widespread production of terrestrial, aerial, and satellite orthographic, multi-, and hyper-spectral, images. Our cyborg collaborators are generating aggregated sets of digitally manipulated images that are stitched together to present a synthetic view that no human could experience directly.

This suggests that the role of the archaeologist in generating these images has been reduced to that of a mere 'functionary' [50], someone 'enslaved' to, and by, the media technologies they use ([49], p. 270), like the "writer who writes for his pen" ([83], p. 76). Today, at least as far as terrestrial imaging goes, that 'someone' is quite often an archaeologist who is trained (or programmed) to compose an overlapping set of views—that, incidentally, conform to millions of other similar excavation plan and section images that have been taken by other archaeologists all over the world for generations—and then press the appropriate button ([84], p. 242). Job done?

Donna Haraway famously remarked that "We are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are cyborgs" ([85], p. 150). As the ever-growing midden of archaeological images needing to be analysed grows, the balance between the proportion that is delegated to a human archaeologist versus that of their machinic collaborators is shifting considerably. Consequently, cyborgs emerging now are increasingly a blend of mainstream AI (Artificial Intelligence) techniques and a small cohort of specialised archaeological imaging technocrats. One dystopian corollary might be that of a growing cohort of archaeological functionaries whose methodologies and research questions have become enslaved to the techno monsters that Haraway alerted us to so long ago [85]. Indeed, our diffractive Virtual Art/Archaeology approach may be regarded as the monstrous, Frankensteinian hybrid spawn of nonhuman, posthuman, post-photographic cyborgs. We take the alternative view that our cyborgic Virtual Art/Archaeology studies have archaeological, artistic, humanistic, and scientific merit.

We applaud Isto Huvila, who suggests that a monstrous perspective may be critically productive in the analysis of visualisation and social information technologies in general. As Huvila argues convincingly: "Building on Haraway, the fact that photorealistic visualizations or other social information technologies (combining human and machine in one) unfold as monstrous cyborgs means that they have a potential to bring forth a range of new ways of interacting and not interacting with information (i.e., information work practices and/or information literacies) better and worse. To understand their potential and related risks, it is important to delve into the complete entanglement of diverse programmes they are driving and driven by, instead of falling back to a dualism of one programme and its anti-programme" ([81], p. 54).

It is the contention of this paper that a Virtual Art/Archaeology approach is a valid way of keeping both the technocratic and machinic gaze of our latter day 'uber-archaeologists' [86] to critical account. By taking a miniscule sample of the masses of available images, or condensed mass legacy images and then subverting them, including their underpinning methods and philosophical basis, we have another transdisciplinary way of holding at least some archaeological cyborgs, and their processes, to account. We suggest that a Virtual Art/Archaeology approach both encourages and acknowledges the importance of creative researchers in search of novel, diffractively critical, ways of perceiving, understanding, and knowing an updated version of the 'archaeological record'.

Through our experimental practices, we have also attempted to critically analyse widely used digital imaging techniques by adopting a diffractive Virtual Art/Archaeology theoretical approach [87] to deliberately dislocate, disarticulate, repurpose, and disrupt the normative narratives they habitually evince. Along the way, we have diffracted art and archaeological practices, human and nonhuman cognition, separate times, contrasting modes of (re)presenting places and settings and other radically opposed scales of perception, to expose the effects of difference and their different affects. Specifically, we have exposed for critical review those hidden spacetime displacements that lay hidden inside archaeological mass images due to the widespread use of imaging black boxes that continue to structure archaeological practice.

Our diffractive *timeshed* images call for new and previously unfamiliar modes of visualisation and interpretation. However, as Mark Gillings, Piraye Hacıgüzeller and Gary Lock argue: "There should be no limit to what is deemed mappable" ([88], p. 12) or, to extend their insight, 'imageable'. The Virtual Art/Archaeology studies presented in this paper should not be thought of as a static record of an object, place, or event. Rather, we offer them as provocations. We hope that more practitioners embrace the idea of developing their own challenging Virtual Art/Archaeology studies that productively unpack, disassemble, and reassemble other digital practices and legacy data to provide new, creative, and affirmatively critical ways of looking at, and novel ways of presenting, temporally flexible, archaeology.

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