

Research Article

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Provenance Illusions and Elusive Paradata: When Archaeology and Art/Archaeological Practice Meets the Phygital

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Abstract: In this art/archaeological study, we question the utility of the interrelated concepts of provenance, provenience, and paradata as applied to assemblages in art, archaeology, and cultural heritage contexts. We discuss how these overlapping concepts are used to establish values of authenticity and authoritative attributions. However, as cultural assemblages are increasingly being extended through virtualisation, they may exist digitally as well as physically, or as combinations of both, that is phygital. We show how provenances and paradata can now become unstable and even detached from the assemblage. Through a sequence of collaborative projects, we expose two provenance illusions at the centre of archaeological recording and presentation practices. In these illusions, the archaeologists and much of the archaeology they record actually disappear from the authoritative reports that are published. Using a transdisciplinary, diffractive art/archaeology approach, these illusions are unpacked to reveal how superficially slight changes to traditional archaeological “drawings” and “photographs” have wrought fundamental ontological shifts in their modern phygital incarnations which undermines their provenances and associated paradata. We conclude that archaeology like fine art does not require conscious paradata in order to support statements of authority and interpretation. Instead, we argue that archaeologists should adopt an art/archaeology approach and subvert and dismantle established practices, methods, tools, techniques, and outputs. By highlighting and challenging inconsistencies in what we say we do with what we actually do, we expose gaps in our knowledge and data and shortcomings in our practices. These deficiencies can then be tackled by developing more robust (trans)disciplinary approaches.

Keywords: art/archaeology, assemblages, diffraction, technical images, transdisciplinarity

Digs escape our grasp because, from the outset, we have held to the illusion that since something from the past remains, it will be immediately intelligible to us. And that is where we are misleading ourselves: This past that emerges for us, because it has been preserved, is withdrawn from us at that very same moment (Olivier, 2011, p. 181).

One often hears visitors to archaeological excavations ask “have you found anything interesting?” The question is profoundly relational and correspondingly complex: What have you found? Where? What is

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“interesting” and to whom? What counts as a discovery? Who is asking the question? Who is being asked? At face value, the question could be construed, stereotypically, on the one hand, as indicating optimism about the possibility of hearing about and perhaps, even better, seeing “exciting” material artefacts and structural discoveries being unearthed. On the other, it could be interpreted as a sleight against the processes of slow archaeology (Caraher, 2015, 2019). What is absorbingly meticulous research for professionals and enthusiasts can be regarded as dull, tedious, and repetitive labour to others. In either (polarised) case, the exploration, interpretation, and presentation of archaeological landscapes, sites, and assemblages are not the sole purview of archaeologists. Equally, the manner in which archaeological discoveries made in the field are framed and presented need not conform solely to standard archaeological practices to make “the archaeology” interesting to a broader set of audiences and other stakeholders. Central to this innocent sounding question are issues of provenance and interpretative authority.

In this paper, we take an *art/archaeology* approach (Bailey, 2014, 2017a, 2017b; Thomas, Lee, Frederick, & White, 2017), which means deliberately disarticulating, repurposing, and disrupting the act and context of “archaeological” discoveries, their registration, their subsequent presentation and, in this case, diffracting these processes through multiple perspectives and interpretations in order to offer new stimulating ways of apprehending archaeological sites and discoveries. We not only diffract archaeological and artistic practices through one another, but also interlace some of the (im)material deposits, artefacts, and assemblages we encountered in the field, with both the physical and digital translations we produce within a “phygital nexus.” In this nexus, we constantly move forwards and backwards across various physical and digital modes of (re)presentation, exploiting human and synthetic modes of cognition, convolving ontological hybrids in the process, and so evolving our extending art/archaeology assemblages (Dawson & Reilly, 2019). Why is a diffractive methodology necessary? Braidotti (2018, p. 15) alerts us to the prosaic character of much digital humanities research, highlighting the widespread practice of 3D modelling archaeological finds as a classic example of an increasingly anemic narrative. We share Braidotti’s discomfort with this “majoritarian meta-pattern” (Braidotti, 2018, p. 15) and wish to argue for the more imaginative intra-active deployment of phygital techniques in archaeological situations through encounters with other disciplines (such as art practice) and other contexts (such as archaeological excavations and art galleries). Hence, following Haraway (1992) and Barad (2007), our method is a diffractive one.

We intentionally exploit our phygital nexus to produce ontologically ambiguous and itinerant art/archaeology translations and release them from their pasts “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” (Bailey, 2017b, p. 700). In other words, we are challenging traditional archaeological and cultural heritage practice-based research by applying our creative transdisciplinary imagination (see Gheorghiu & Barth, 2019; Gheorghiu, 2020; Thomas et al., 2017). We do not intend to rehash “institutionally safe narratives conventionally certified as truth.” Instead, we adopt the position of “artists who use the past as a source of materials to be reconfigured in new ways to help people see in new ways” (Bailey, 2017b, p. 691).

As our project is “transdisciplinary” and involves diffracting several viewpoints for multiple audiences, we will first give a deeper account of what we mean by that term, how we came to this position, our combined motivations, and also unpack a number of key terms and concepts which we share in our different disciplines, but have nuanced to substantially different meanings depending on their disciplinary context: assemblages, provenance, and paradata. We will then introduce and unpick two provocative provenance illusions and present our art/archaeology responses. Finally, we will discuss some of our insights, drawn from our art/archaeology studies, into the ontological shifts that archaeological assemblages can experience and their implications for practitioners.

1 Why Transdisciplinarity?

We take our inspiration from Ruth Tringham, who made a plea for a richer, fuller, and more complex archaeology, one which “[flows] into other disciplines easily, driven by sensorially rich and complex lateral thinking and playful exploratory imagination” (Tringham, 2016, p. 57), a point echoed at a broader level by

Tsing (2015, p. 285) who advocates “designing research that requires playgroups and collaborative clusters.” Tringham is not the first to suggest that archaeologists should embrace the intellectual and creative talents, and affordances, of colleagues from other disciplines. Indeed, archaeologists can point to a long history of productive cooperation with sister disciplines. Our long-standing tradition of (inter)collegiality is reflected in the names of the many sub-disciplines which could be reeled off (e.g., computer archaeology, classical archaeology, archaeometallurgy, environmental archaeology, and an almost endless list). Tringham is alluding to markedly fluctuating levels of cross-modality and varying degrees and intensity of cooperation and interaction from department to department, project to project, and indeed across archaeology internationally. In connection to this, Liv Nilsson Stutz (2018) characterises three levels of increasing disciplinary cooperation within archaeology projects as multidisciplinary, interdisciplinary, and transdisciplinary. The weakest level of interplay being multidisciplinary where parallel sets of activities are assembled to build out a collage of adjacent insights. Interdisciplinary projects require a higher level of integration and harmonisation of activities within an integrated and coordinate whole. This is taken further in transdisciplinary projects in which practitioners extensively interweave their complimentary disciplinary skills, and methods, and apply them to a common set of issues, to produce outcomes which can be judged to redefine important aspects of the disciplinary boundaries of all of the cooperating disciplines involved.

The work presented here is part of a set of sensorially rich collaborative interventions by an archaeologist and three fine art practitioners. As collaborators over several years, we have progressed through these deepening levels of cooperation and now revel in going beyond the mere conjunction of “art and archaeology” and strive together to avoid the all too common criticism that the relative contributions by, and benefits to, our participating fields of practice are unbalanced¹. By contrast, the body of work presented here is intended to be a contribution to “art/archaeology” studies, by which we mean the fusion of two dynamic and complementary practices which when mutually stimulated generate new and provocative conceptions of knowing that transcend and consciously disrupt traditional time-honoured approaches to research and practice used in field archaeology. Our approach throughout is to imbue our efforts with the two key qualities identified by Roberts and Sterling (2017) as being diagnostic of successful collaborations within the so-called “creative turn,” namely, a transdisciplinary entanglement of concepts and questions and the grounded participation of all the archaeologists and artists involved in these projects (Thomas *et al.*, 2017). Our overall “ecology of attention” (Crawford, 2015) is focussed on how as different disciplinary practitioners we probe, make sense of, record, and represent the space and landscapes of excavations and the assemblages we co-produce. The ontologically rich set of archaeological, artistic, and art/archaeology responses we produce give us surprising new insights into our different ways of knowing, our different modes of expression. We argue that when our distinct embodied disciplinary practices are diffracted through one another, they enable subtle but consequential differences to emerge, offering insights into the nature of the assemblages we simultaneously dismantle, participate in, and co-produce. We intend to show some important effects of difference in disciplinary practices using a series of diffractive art/archaeology collaborative projects exploring and reexpressing three key concepts: assemblage, provenance, and paradata.

2 Concerning Assemblages, Provenances, and Paradata

Whether one is operating in a multi-, inter-, or transdisciplinary context, effective communication across disciplinary boundaries is crucial within the team and beyond. To this end, the three key concepts of assemblage, provenance (provenience), and paradata, which we share as practitioners, will be unpacked

¹ For instance, Calejari (2019, p. 14) asserts that “On very rare occasions art events suggest new paths for archaeological research” whereas artists “have often been inspired for better or worse, by archaeology.” Mármol Martínez (2019, p. 59) suggests that this is because archaeologists have failed to take on board what art practices can offer.

in order to expose how we creatively inflect their different meanings. We will offer provisional definitions of these cross-disciplinary terms and concepts, but will explore them in more depth in the art/archaeology case studies that follow and reassess them again at the end of this paper.

For archaeologists, assemblages traditionally referred to a set of artefacts found in a common context – a pit, or a ditch, or a foundation – or a group of objects of a similar type, date, or material – Iron Age ceramics, Roman bronze, for example (see Lucas, 2012). As Yannis Hamilakis and Andrew Jones observe, the concept of assemblage is common to several disciplines besides archaeology but most notably art, where the unfolding, relational, and affective nature of assemblages has long been recognised and been explored by artists (e.g., within the Dada and Surrealism movements) through, for instance, their practices of collage making and performance art. The key point is that for artists “the making of assemblages is a dynamic but also deliberate rather than random process [and] the juxtaposition of distinctive elements can be transformative, generating new entities, new possibilities and new ways of understanding” (Hamilakis & Jones, 2017, pp. 77–79).

Adopting Barad’s (2007) relational realism approach, the identification, selection, definition, measurement, and registration of any of the entities typically identified in archaeological or artist practice (e.g., anomaly, artefact, assemblage, cast, drawing, feature, layer, line, photograph, sonograph, or video and sound recordings) are actually co-produced by a complex blend of agents, each with a particular set of affordances and capacities, which intra-act in different ways depending on how the specific articulation of day to day practices and apparatus is enacted. In other words, they emerge from specific relational configurations and performances of assemblages which therefore create a “creative nexus of negotiation” (Perry, 2015), be that spadework or screenwork (Edgeworth, 2014). At a general level, these dynamic assemblages include the practitioner, research objectives, the instruments and tools deployed, the material objects (artefacts, ecofacts, layers, or contexts), ambient environmental conditions, the nature of the intervention, time constraints, time of day, resolution, scales and conventions, and so on. This entire assemblage participates in the registration/recording process as it unfolds. Indeed, the importance of the creative and craft aspect of both spadework and screenwork in shaping archaeological and art assemblages and the production of art and archaeological knowledge in both the physical and the digital are widely acknowledged (e.g., Berggren & Hodder, 2003; Edgeworth, 2013, 2014; Gheorghiu & Barth, 2019; Gheorghiu, 2020; Reilly 1985, 1991; Reilly, Todd & Walter, 2016; Shanks & McGuire, 1996). Here, we argue that interpretation arises from the interplay of many factors and their interconnections. As Alberti, Jones, and Pollard (2016) put it “these interconnections are always changing; they are immanent and in a constant process of becoming.” Describing these factors and their effects on the knowledge we produce is clearly not straightforward.

The term *provenance* is also common to many disciplines, including anthropology, archaeology, art, geology, history, and palaeontology, and figures prominently in relation to “scientific” digital data sets and the open data movement more generally. However, different disciplines display distinct epistemological proclivities in the application of the term. In art and archaeology, “provenance” has two related, but quite distinct, meanings. For archaeologists outside North America, “establishing the provenance” of something entails defining the place of origin, or discovery, and articulating the specific “context” of the thing of interest’s findspot, which could include the circumstances surrounding its discovery (e.g., picking up a stray surface-find in a large field, uncovering a diagnostic artefact in tightly defined and sealed archaeological deposit, or detecting an image or marks hidden beneath an overlying surface). In American English, the cognate “provenience” is more generally employed to convey the same meaning. Alternatively, the term *provenance*, as used by galleries, libraries, archives, museums, and other cultural heritage professions (in both British and American English usage), also refers to the chain of custody, or ownership, including a chronology of any material changes or alterations to the work or artefact from its maker, or place of manufacture, to the present. In other words, it refers to the documented authenticity of special or commercially valuable objects and provides a biographical account and an itinerary of their life journeys (see Joyce, 2012; Joyce & Gillespie, 2015).

Conceptions of provenance are not restricted to just physical things. Establishing the provenance of immaterial digital objects is a central concern of many organisations and institutions. By whom or what,

where, why, how, in what kind of environment, and under what sort of circumstances digital data and virtual objects, such as 3D visualisations, were generated and subsequently stored, shared, (re)used, or modified are all vital pieces of information for demonstrating transparency and integrity in many professional situations. The provision of such information is intended to help researchers to credit the originator and, relatedly, assess the quality, reliability, and trustworthiness of the data or evidence under consideration. The documentation that encapsulates this information is known, for example, by the World Wide Web Consortium (W3C) as “provenance metadata.” In the contexts of digital archaeology and virtual heritage parlance, this highly prized information is widely known as “paradata” (see Bentkowska-Kafel, Denard, & Baker, 2012), a term enshrined in the *London Charter for Computer-based Visualisation of Cultural Heritage* (London Charter, 4.6) since 2006.

The term paradata was coined in 1998 by Mick Couper in order to distinguish auxiliary data, describing the processes by which interview survey data were obtained, from the established metadata that describe the collected data themselves (Couper, 2000). Since then, the definition of paradata has vastly expanded. In contrast to the generally uncontentious static properties of data captured as metadata (e.g., shape, dimensions, weight, location, colour, and so on), the plethora of activities, and the many extraneous by-products of research activity, which affect what and how data (or evidence) are actually incorporated into an interpretative framework, that is the paradata, are much more fluid and wide ranging (e.g., Edwards, Goodwin, O’Conner, & Phoenix, 2018; Egel-Andrews, 2012; Huggett, 2014, 2020; Richards-Rissetto & Landau, 2019). In social research, paradata include marginalia and fieldnotes. Paradata are also familiar to sociologists (Edwards *et al.*, 2017). In the case of the intersecting practices of fine artists and field archaeologists, paradata is an especially rich concept. For example, *Epoiesen*, an online, open-access publication, characterises itself as:

A journal for exploring creative engagement with the past, especially through digital means [publishing primarily] what might be thought of as ‘paradata’ or artist’s statements that accompany playful and unfamiliar forms of singing the past into existence. *Epoiesen* is therefore a kind of witness to the implied knowledge of archaeologists, historians, and other professionals, academics and artists as it intersects with the sources about the past (*Epoiesen*, 2020).

Even though huge amounts of effort go into producing paradata for virtual archaeology and cultural heritage models, as Huvila (2012, p. 105) notes, our efforts to document the complexity of our intellectual processes is hampered because “we are still lacking many practical and perhaps especially theoretical instruments to realise the stated aim of paradata; to make transparent ‘the human processes of understanding and interpretation of data objects’ in practice.” A common concern within the virtual archaeology and heritage communities revolves around the (lack of) definition of the appropriate level of detail, or “granularity” (Baker, 2012). The *Seville Principles* for virtual archaeology, for example, simply refer to paradata in terms of the need for clarity, conciseness, and availability, alongside the importance of providing as much information as possible (Bendicho, 2013, p. 280). Since it isn’t obvious what constitutes meaningful paradata (Mudge, 2012, p. 180), it is perhaps not unreasonable that some scholars question whether the intricacies involved in gathering paradata for 3D models are actually worth the effort. Sven Havemann (2012, p. 158), for example, argues that “[a]t some point, the effort that is needed becomes questionable, all the more so when the paradata become so complex that their usefulness is open to debate.” Martin Turner wondered whether the creation of metadata and paradata was actually more of a curse than a benefit in documenting virtual heritage (Turner, 2012). Perry (2015) went so far as to suggest that in some circumstances these efforts are simply futile.

It is concerning that paradata do not necessarily account for all the relevant information affecting the processes through which data and metadata are selected and recorded. The implication that paradata are not exhaustive makes them “paradoxical,” which indicates, as Beacham (2012, p. 52) points out, that when the scholarly visualiser lays out the evidence from which their models were crafted, interpretative lacunae in the paradata offer potentially creative spaces from which others might take interpretative leaps into the dark and “almost magically find something there to catch and hold us” – a compelling illusion for example.

In summary, assemblage, provenance, and paradata are overlapping but loosely coupled concepts. Neither archaeological or artistic assemblages are found or discovered; they are both co-produced by

practitioners who select and articulate specific elements in particular ways to generate meaning. The value of any assemblage that emerges is partially dependent on the perceived authority of its makers and, crucially, a demonstrably secure provenance (provenience), or context of production. In the case of the archaeologists, there is a requirement to document the processes they followed and the decisions they made in selecting and articulating the assemblages they present. However, it is abundantly clear that our practices of producing paradata are inconsistent and open to criticism. By contrast, the equivalent process information associated with the making of a fine art assemblage is generally much more loosely described, if at all, in an accompanying artist statement. It is far more important to securely associate the making of the art work with its maker (and, later, the owners of the work).

Having laid out our principal transdisciplinary motivations to cooperate, and considered the terminology we deploy, we will now return our attention to our work out in the field in order to introduce the first of two provenance illusions that inspired the art/archaeology interventions we will describe later. Both these illusions when unpacked reveal important insights into archaeological assemblages arising from ontological shifts that occur when the archaeological assemblages are rearticulated in new art/archaeology contexts using different media.

3 Introducing a Provenance Illusion

Probably, the most familiar trope of archaeology is that of the archaeologist discovering and meticulously recording artefacts, features, contexts, layers, or structures, which are revealed during the course of field work. We will argue that such apparent “acts of discovery” (Edgeworth, 2003) are *provenance illusions* which, despite decades of reflexive methodology (Hodder, 1997), generally begin to unravel at the trowel’s edge.

Excavation reports are full of photographs and drawings documenting crucial aspects of the excavation intervention. They (re)present the archaeological record. They are generally regarded as documents of provenance and key paradata par excellence. We, on the contrary, regard them as unwitting props in what we call “provenance illusions.” Consider the scenario captured in Figure 1. This photograph is not the kind you will often see illustrating an archaeological report. It was taken by an archaeologist who thereby recorded artists-in-residence recording archaeologists at work, who are themselves recording the final excavation drawings. Who are these people and what are they recording?

The first part of the provenance illusion is to make all these people vanish. Many commentators have noted the token acknowledgement given to the vast majority of archaeological field team members who did the actual digging and performed the primary recordings (translations) of deposits (e.g., Baird, 2020; Berggren & Hodder, 2003; Everill, 2009; Huvila, 2012; Olivier, 2011; Perry, 2018). The “diggers” more or less disappear, anonymous, into the archives, out of the final authoritative statements promulgated through traditional hegemonic published reports. In their place, we find accounts of *some* of the things these practitioners identified and recorded in the form of photographs, drawings, and abstracts from context sheets, minus any clear connection to the excavation processes (Sanders, 2012, p. 40), and generally lacking the richness of the process information locked within individual daybooks, which may be incorporated into the physical archive, but will not be published even within the digital archive (Huggett, 2014). In other words, linkages between the contexts and their provenance and paradata are quickly unravelling. We should also note that the spoil heaps – the shifted ground – of disarticulated excavated materials (minus artefacts and samples) will also be airbrushed out of the excavation account. This brings us to the centre piece of this illusion, namely that rather conspicuous hole in which the archaeologists are making their “records.”

Consider Figure 2 which depicts two familiar forms of archaeological record. The image at the top is an ortho-rectified “photograph” – a sophisticated, industrialised method of recording, using digital photogrammetry. It shows one side of a trench made in the Moel-y-Gaer hillfort in Bodfari (Lock & Pouncett, 2012, 2014), North Wales, through the “aperture” of a void made through excavation (Hicks, 2020, p. 233).



Figure 1: Vibrant matter, the archaeological record, and a provenance illusion.

Like all archaeological excavation images, it depicts what has **not** yet been and often, as in this particular section, will not be excavated. The orthoimage of the trench section operates as a kind of Foucaultian heterotopic mirror in which the “incompatible spaces” of the deposits, now displaced from the void but in which the viewer is apparently standing, are somehow reflected like the figures captured in the mirrors of Edouard Manet’s (1882) *Bar at the Folies-Bergère* (Foucault, 1986). However, appearances notwithstanding, this orthoimage, like all digital images, is not a photograph. The orthoimage has more in common with a spreadsheet than a photograph. Think about the histogram view of the raster sample of photon readings that form “the image” taken on the average digital “camera.” As May (2019, pp. 50–52) puts it very neatly: “Photographs, never intrinsically calculable, remain thoroughly visual. Images, structurally calculable, are only apparently visual.” Digital images may borrow some of their visual appearance and vocabulary from earlier media like drawings, painting, and photography, but we should realise that they are ontologically quite distinct (May, 2020, p. 52). As Zylinska (2017, p. 26) reminds us, images “arrive to us as data which is then assigned visual characteristics and converted, or rather translated, into what we humans recognise as photographs.” The orthoimage is a classic example of what media theorist Flusser (2011) calls a “technical image;” in this case, one with no perspective distortions, manufactured from a mosaic of machine images that have been digitally warped and stitched together to produce a synthetic view that no human could experience directly. The role of the field archaeologist in producing this image is reducible to that of what Flusser laments as a mere “functionary,” someone who Sean Cubitt (2014, p. 270) sees as “enslaved” to, by, and in media technologies, like the “writer who writes for his pen” (Virilio, 1994, p. 76). Here, the “someone” is an archaeologist programmed to compose an overlapping set of views that conform to millions of other section images taken by other field archaeologists all over the world for generations and press the appropriate button (Lucas, 2012, p. 242). The image appears to have more agency in its own making than the passive slave to convention taking the picture. Once again, we detect the field

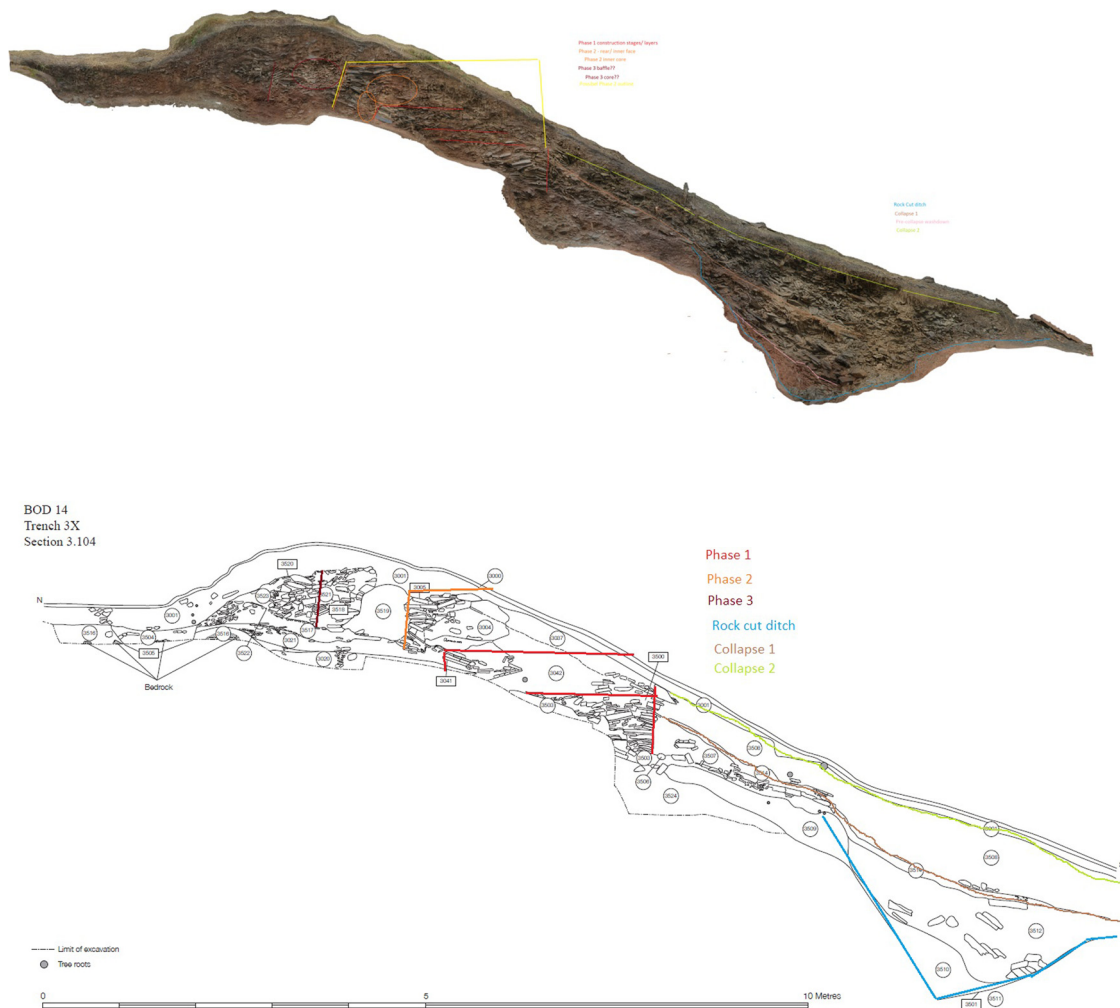


Figure 2: Bodfari Trench 3 sections (digital orthoimage and scanned hand-measured drawing).

archaeologist being squeezed out of the picture, incidentally brushing away their own footprints and avoiding any telltale shadows.

Continuing with our task of exposing the provenance illusion, now consider the corresponding interpretive scale-“drawing” of the same section shown underneath the orthoimage. This is also another digital skeuomorph, previously an analogue diagram drawn on paper, but now a digital image stored in a file and displayable on many different screens at various resolutions with their own particular presentation and interaction characteristics. However, what is important to note here is how the material archaeological deposits excavated in the void of the foreground of the orthoimage are no longer reflected in this section translation.

Most features uncovered in excavations are not symmetrical and therefore any section cut cleaves an arbitrary profile. Equally, the great majority of features will not intersect with the definitive final sections of the edge of the trench. Digital archaeological orthoimages, photographs, and drawings of any section clearly can only project onwards a partial material memory of some aspects of some features that some members of the excavation team encountered at some point before the features were shifted to a spoil heap. This is just as true in single context recording. These images have as much in common with forgetting as remembering (Olivier, 2011). However, there is no way to identify the existence of those many seamlessly missing “material memories” not inscribed on this convincing but composite, partial, abridged, and interpolated backdrop called the “section.” Moreover, the drawn lines that are presented actually indicate

discontinuities such as the interfaces between contexts or layers that happened to intersect with the section. These immaterial elisions and conjunctions within the material makeup of the deposits indicate episodes when stratigraphic accumulation was interrupted, and where materials have been removed. In other words, they indicate something that was already absent before the archaeological intervention. Ironically, stratigraphic profiles conventionally present these immaterial absences as solid graphite lines, whereas the material layers exposed in the section and sitting above and below one another, with no space between them, are left “empty,” that is un-presented. The illusion is complete, the material encounter of the diggers with the deposits of archaeology has been more or less expunged. Both diggers and deposits have been erased. They are not “accounted for” in these images made in the genealogy of spreadsheets. These digitally skeuomorphic diagrams mark only immaterial absences detected in the sections of the material deposits that have not (yet) been excavated. Both the orthoimage and the digitised interpretive section drawing of record can be thought of as akin to Fforde’s (2002, p. 136) glorious fictional “mnemonic wallpaper,” displaying as they do only partial and composite memories. In short, our confidence in the provenance and paradata associated with the descriptions of the alleged assemblage (and its components) physically uncovered by excavation seems profoundly misplaced as their own provenance is highly questionable.

4 (Re)Filling the Void

Can we begin to recover and better understand the unfolding multimodal nature of our practices within the multifaceted archaeological record? Can we capture more nuanced or novel paradata to enrich the provenance of our assemblages by emancipating the functionaries and bringing the practitioners with their various tools and methods back more fully into the picture to be acknowledged? How might we replace the void, reverse the entropy, and recognise the skill and knowledge of the practitioners? In short, can we reconfigure and extend the assemblage to more fully represent the who, what, and how of its making and better demonstrate the real artistry involved in shifting ground in archaeological excavation? We believe a transdisciplinary approach to these questions will produce some fruitful new ways to address this challenge. In the following section, we present some of our art/archaeology reconceptualisations of practice in archaeological excavations.

4.1 Joining the Dots

Wassily Kandinsky famously said that “everything begins with a dot.” Extruding a point will produce a line, and extruding a line will produce a plane (Kandinsky, 1926). One way of working back into the aperture of the void (i.e., the space of the excavation) is to radically restate the trench sections and reduce them to a bare minimum and build back out from there. The screenshot in Figure 4 is a frame from an animated work called *Immersive Trench* (Gant, 2016) by Stefan Gant, an artist who describes his practice as “extended drawing.” (The full animated work can be viewed in Supplementary File 1).² In this piece, the colours of a single column of soil particles were captured via an intimate traverse down a trench wall using a digital video camera in macro mode; the embedded cognitive capabilities of the digital device thus harnessed become an extended drawing tool (Figure 3). Each suspended coloured line in this image references a grain of soil, a unique 3D point on the side of the excavation, a moment of deposition translated into a pixel, and then stretched into a drifting line of pixels. As Michael Carter (2017) notes, even a single 3D point can be a powerful locus of agency in virtual archaeology. Every dot of colour recorded by Gant in this most

² The supplementary files are available at <https://doi.org/10.1515/opar-2020-0143>.



Figure 3: Stefan Gant drawing a section at Bodfari hillfort (photo: Callery, S.).

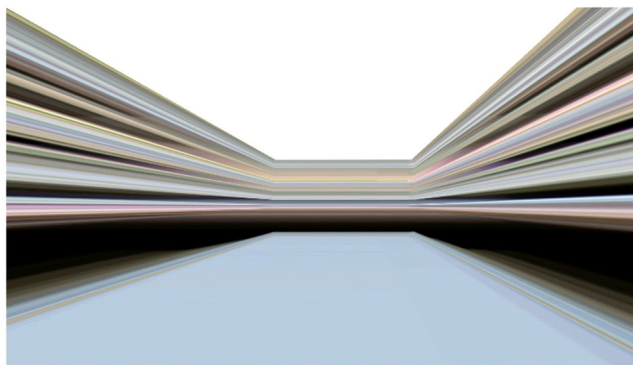


Figure 4: Frame from *Immersive Trench* (Gant, 2016).

economical of “point-cloud” is an agent of memory and loss, retaining unique attributes of both the materiality and temporality of the substances that lined the trench. Potentially taphonomic markers, these grains are extruded around the virtual trench sides to create lines that recall “microstrata.” These lines of microstrata are concatenated and presented in reverse sequence, that is bottom to top, in the order that the grains were deposited. Rising from the base of the virtual trench, they seemingly track towards our ongoing present in an inverted form of percolation. These microstrata float up through the space once filled with forgotten sweeping gestures of trowelling archaeologists like virtual soil on the way to a digital spoil heap.

Some extruded lines transform into taught horizontal “sheets” of colour which seem to float and then fade back into lines. These sheets denote the major stratigraphic interfaces between two distinct layers superimposed one on top of the other, an absence-presence reflecting a stratigraphic interlude.

The affective effect of Gant’s enquiry is an immersive spatial experience that offers viewers novel glimpses into the act of excavation through the medium of reverse-engineered and redrawn microstratigraphy. The shimmering expressiveness of this extended drawing reminds us that sections and stratigraphy are not static things. They are mutable. Through excavation, sections dynamically unfold. Although they have been sculpted by archaeologists to fit a conventionalised archaeological drawing and photographic processes (Lucas, 2012, pp. 238–240), they could still be translated in many other different ways. Each translation bears a unique biography, but so far it is only the “extended drawing” of the section by the artist that is clearly attributed. However, Gant’s piece does allude to the embodied practice of the still anonymous archaeological diggers who made this aesthetic translation possible. *Immersive Trench* in restating the relationship of a column of soil grains to the rest of the trench conveys powerfully the point that archaeological sites are not static. It also conveys overlapping pluritemporal deposits as in-formation and the dynamic procession of ephemeral moments experienced by the archaeologists as they work deeper into the trench. This piece can be read as a visual, spatial, and temporal restatement of Olivier’s (2011, p. 181) profound archaeological observation: “Everything in the earth is floating in uncertainty, in a realm of maybe. We dig by sight, into extraordinarily rich and complex matter where the past we are looking for is closely entwined with its pre- and post-history.”

A flat surface, such as the coloured planes that appear in Gant’s *Immersive Trench*, is probably the simplest topography one could hope to encounter. Out in the field, a mosaic floor would be a good example. However, the emerging terrain of archaeological excavation landscapes is more often not nearly so accommodating. Deposits are frequently amorphous and intangible and require complex negotiations to deal with. Taut symmetrical sheets do not sit comfortably on top of uncompromisingly irregular terrains. Instead, archaeologists typically abstract the outlines of archaeological features and project them up, using plumb lines or pantographs to avoid parallax, onto flat 1:20 cartographic plan drawings on sheets (or perhaps, mnemonic carpets) of plastic film. If we want to map these features while accounting for the local topography, we need some way to closely fit the drawing support over the surface of the area to be recorded. One approach would be to loosen the previous taut rectilinear sheets and cut them into more accommodating flexible polygonal panels, or patches, that could be meshed together, or tailored, to form a closer fitting landscape model. In computer parlance, the equivalent rendered polygonal mesh models are sometimes called “rubber sheets,” but archaeologists refer to them as “digital terrain models” (DTMs).

Simon Callery has been collaborating with archaeologists as artist-in-residence on several excavations over a number of years (e.g., Callery, 2004, 2014; Callery & Gant 2018; Noga, 2015; Westall, 2015). He is inspired by archaeological excavation landscapes, “places where time and material come together most convincingly” (Callery, 2018). Lately, he has been refining a technique he calls “contact painting” in which he brings flexible painted polygonal canvas panels into contact with both the exposed archaeological terrain and, equally, the growing void of the trench. Although Callery has repeatedly stressed that archaeology is not the subject of his work, he does acknowledge that archaeological embodied experiences helped him train his own senses to a higher degree of awareness.

Once in contact with the physical archaeological surfaces, the artist makes his way over the canvas on his hands and knees, feeling his way through the cloth using his hands to discern, define, mark, and record haptically detected features, which he traces using a pencil. The canvas supporting Callery becomes a material instantiation of the immaterial stratigraphic interface lying in-between, that is both above and below, distinct physical archaeological strata, some of which have been removed to the spoil heap while others remain uninvestigated. The exposed surface of the pending context or layer of vibrant matter (Bennett, 2010) was previously trowelled “clean” and a 1:10 plan drawing made by an archaeologist standing on top of the layer below. The artist’s subsequent pencil flows follow the trace of the archaeologist’s trowel and pencil to make 1:1 scale contact outlines (Figure 5). While the archaeologist was defining the top of the emerging features, Callery is tracing the bottom of the contexts above his canvas; those stratigraphic units which have already been emptied out. Both the artist and the archaeologist make their



Figure 5: Simon Callery developing a canvas panel for a contact painting at Nesscliffe hillfort excavation 2019.

mark-making decisions in the context of the trench itself. The suggested parity of gestural intent is further reinforced by the deployment of graphite and the transfer of the material matrix of the exposed archaeological surface into the canvas, an echo of the muddy smudges that insinuate themselves into plan drawings. Next, sharp scissors track the graphite marks, slicing through the canvas. Callery's breaches "follow the cut" (Edgeworth, 2013). There is an echo in Callery's art/archaeology practice with that of the artists employed to document African rock art for the German Ethnographer Leo Frobenius in the earlier part of the twentieth Century. While on tour, Frobenius' workers would create *in situ* rubbings, tracings, and water-colours to create murals that synthesised a reconstruction of the archaeological site with languages of modern painting. The shallow depth of field and linear drawing styles of Kirchner and Kandinsky are co-constituted with representations of archaeological motifs and cracks on rock faces (Kohl, Kuba, & Ivanoff, 2016). Like the art/archaeological experiments of Callery, this too was a collaboration between highly skilled practitioners enacting a form of contact painting, a commune between the painterly gestures of expressionism and historical illustration. Callery extends his own panels of rubbed and marked canvases in his studio by machine sewing several of them into larger assemblages, producing meshworks of patches literally stitched together. This creates a canvas equivalent of the digital 2.5D polygonal mesh terrain models overlain by planned features generated by archaeologists using GIS technology. The topology of the elements in these canvas assemblages is very much considered. The vertical and horizontal lines that emerge are gestures towards the complexities of stratigraphy. According to Callery, "the encounter with stratigraphy made [him] think much more carefully about how [he] could use line... A vertical line has the effect of stopping the eye on the surface of the canvas; it makes you relate to the painting as a physically marked surface. The effect of a horizontal line lends the flat surface a suggestion of depth. Physicality rather than an illusion of depth [begins] to dominate the work" (Bonaventura, 2014, p. 200). Finally, like the digital plans housed in the GIS which must be displayed on a flat screen to be reexamined, the traces of the same horizontal surfaces that Callery worked on will be rotated through 90° in order to be viewed in an exhibition.

4.2 A Microscopic Imaging Incursion into Nonconscious Paradata

Callery feels no need to consciously write down all the minute decisions, that is the paradata, involved in making his works. He does, however, leave clues, nonconsciously (Hayles, 2017), in the form of material traces which are a form of paradata auto-archived in the works themselves. Callery made available three canvas panels in order that we might, in a disciplinary recursion of practices, examine his art/archaeology in intimate detail under a lens to determine whether we could detect such auto-archived paradata in an artwork developed on an archaeological site.

One panel was unprocessed except for having been cut off the roll as purchased. The second panel was almost identical, except the commercial size had been washed out, which is done because the manufacturer's size compromises the longevity of the fabric. The third piece was a composite that had been washed and then impregnated with a red oxide distemper. This latter artefact had also been scuffed, breached, with sutured flaps reattached, and the assemblage connected by machine and hand stitchings (Figure 6 left). Under forensic investigation, we could indeed see his process unfolding. Microscopic examination confirms that before arriving on site, the weave of the canvas is stiff and clean (Figure 6, top right). Next we can observe the effect of washing out the commercial size which has opened up the weave. Note the dark particles tangled in the loosened threads (Figure 6 right, 2 down). These are due to Callery's habit of washing his canvases in a river close to the excavation site. A strong, deep matt coloured pigment (mars red) has been mixed with a new size and then worked deep into the softened canvas (Figure 6 right, 3 down). The application of the distemper is not especially even, and weathering and onsite scuffing have added additional interesting textures to the emerging painting. This painted panel was then laid down directly on an archaeological surface in a trench within Nesscliffe hillfort in Shropshire (Lock & Reilly, 2020) and drawn upon. The trace of the pencil around a feature of interest leaves a trail of graphite prints in the tops of fibres (Figure 6, 4 down). A close up of the cuts and stitching back together shows the neat machine stitches, but also that the distemper did not penetrate to the core of the canvas threads (Figure 6, 5 down and Figure 7).

We soon worked out that the flexible LED lamp used to light the samples under the microscope could be used in conjunction with a 0.5 mm ball bearing to create a workable micro-Reflectance Transformation Imaging (m-RTI) solution, which allows researchers to interactively relight the digitally recreated subjects

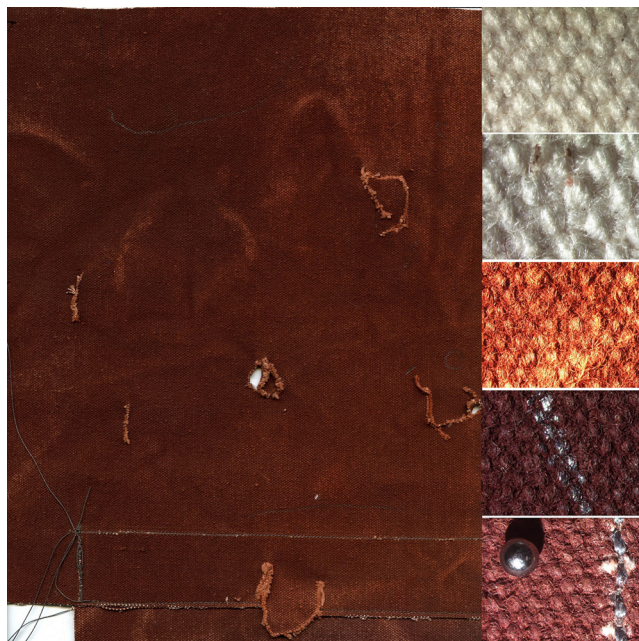


Figure 6: Simon Callery contact painting paradata under the microscope.

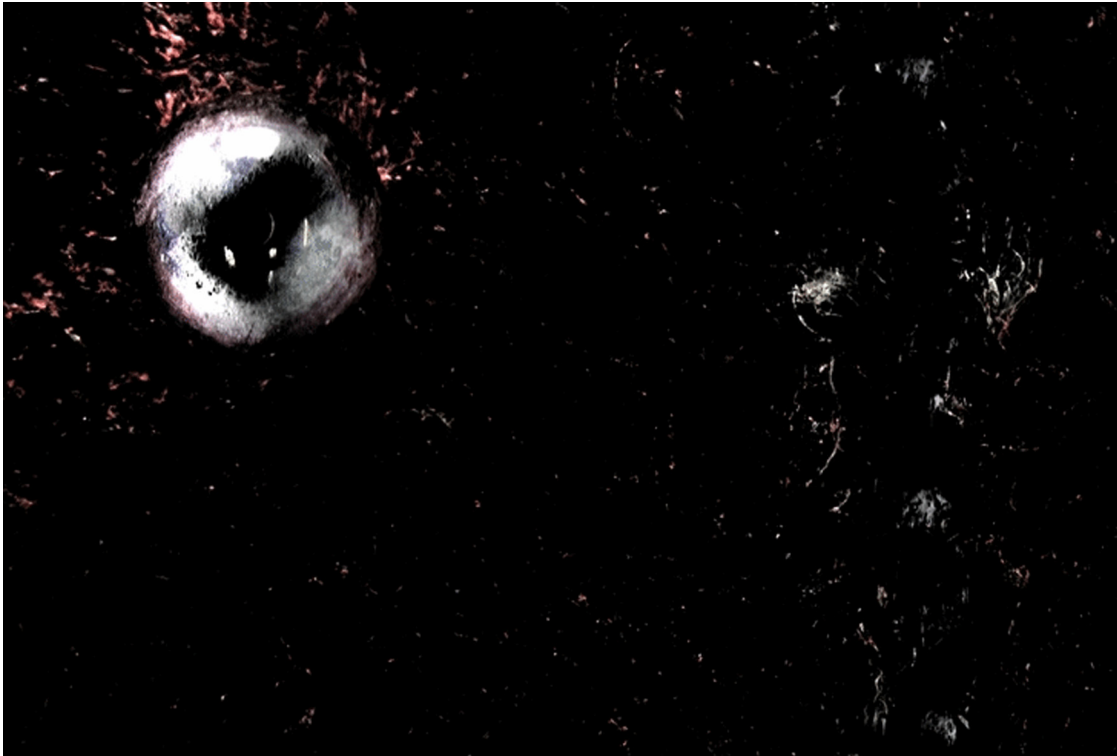


Figure 7: Micro-RTI of Simon Callery contact painting panel using multiple rendering modes, Sphere scale 0.5 mm (animation of this figure can be viewed online, see Supplementary File 4).

in order to enhance “surface” details. An RTI is an interactive archaeological and cultural heritage “technical image.” Equipped with a compiled RTI (see Historic England, 2018), we could interactively relight the now digitally (re) painted canvas, virtually, to enhance our analysis into how the canvas was prepared and developed. It also allowed us to experiment with the apparent materiality of the work by applying RTI filters such as diffuse gain or specular enhancement (Figure 7).

The last thing we studied before the pandemic interrupted our collaboration was a fragment of the worked Callery canvas at very high magnification using a laser scanning confocal microscope, an optical imaging technique that cuts in slices through the object using lasers (Supplementary File 2). The confocal microscope has evolved from technologies found in the slit lamp apparatus used in ophthalmology to shine a slit of bright light directly into the eye at various degrees, developed in part in the nineteenth century by Helmholtz whose experimentation with optics and the physiology of vision developed a philosophy about the visible and the invisible. The Leica confocal microscope is a high-magnification, high-resolution imaging device, which projects a scanning laser beam that excites the fluorescence in the object of study by agitating its photons. The laser beam is bounced across multiple movable lenses and through a pinhole in order to control the refraction and fluorescing process and the data is collected in hundreds of layers of images. This confocal apparatus is operated at the wavelengths of the laser; the angles of the mirror and the width of the slit are all adjusted together at the time of the scan in a live dialogue between operator, equipment, and object as the sample is constantly refocused and reimaged. This is manipulable and malleable imaging as we make a new “plastic” image from this assemblage.

Striking effects are created by particles inside the painted canvas when vibrated at different frequencies and emit different wavelengths of light. Every vibrant colour denotes the gestures of particular kinds of particle which, like us, have been excited by the encounter. Previously buried inside the weaves, these particles and their associated traces now emerge in vivid bright red, blue, and green. We reconfigure lenses, mirrors, and apertures to reveal more traces in the shifting boundary between visible and invisible, a grey zone to focus our thinking upon.

Zooming out, we can turn our attention to an exhibited work and put these enacted paradata into context (Figure 8). *Country Register* (Callery, 2018) is a contact painting developed on the Bodfari hillfort excavations in North Wales (Lock & Pouncett, 2012, 2014).

Callery's contact paintings express the colour-saturated surfaces and interfaces that dominate archaeological discourse in an unique and thought-provoking aesthetic topology. Although they are made by a practitioner in direct contact with an archaeologically defined surface, unlike the standard archaeological trench plan, the features in this archaeological landscape retain some depth and there is no so-called god view illustrated in the orthoimage in Figure 2. His canvases are purposefully crafted to extend the sensual encounter beyond just the visual and draw more kinaesthetic attention and intra-action from the visitor's entire body. One very remarkable aspect of Callery's contact paintings is the gestalt shift caused by conceptually situating his canvases at the bottom of the previous excavated strata, rather than on the top of the next archaeological context awaiting investigation. In effect, his breaches through the layers of canvas do not pull you down into the buried deposit but drag you back into the guts of stratigraphic ghosts in the excavation void; the material hanging from the cuts in this reading therefore gestures to later contexts and the archaeological concept of residuality.

This radical reconception of what is being registered in an archaeological context is not entirely unprecedented. Reilly and Shennan (1989), for example, applied constructive solid modelling (CSG) to try to detect underlying features within the deposits overlying them, using a Constructive Solid Geometry (CSG) digital model of the excavations of a Bronze Age site at St.Veit-Klinglberg, Austria (Figure 9). Planned outlines of underlying features were digitally extruded to create geometrically solid prisms which were then *intersected* with the solid-modelled overlying deposits. By colour-coding selected archaeological components, researchers could search for potential diagnostic indicators of the subsurface deposits in the overlying strata by slicing (i.e., virtually resectioning) the model. These 3D visualisations have an uncanny inverse relationship with Callery's work. Digitally "solid" substrates, immaterial interfaces, and emptied stratigraphic contexts, embedded in the void of the excavation, are interlaced in two non-standard ways that bring some further thought-provoking (im)material, temporal, and kinaesthetic dimensions to our



Figure 8: *Country Register*, Callery (2018). Courtesy the artist, copyright.

shifting multidimensional and pluritemporal “archaeological record.” They draw attention to the “interiors” of deposits and subtly refer to the dynamics of successive archaeological landscapes and their residual interconnections that are usually lost in standard archaeological photographic and drawing records. This begins to open up an important contradistinction with the usual narratives about surfaces (or nonconformities) that still predominate in archaeological accounts of excavation (Simonetti, 2015).

Stefan Gant is also developing novel approaches to explore the many different modes of archaeological encounter with stratigraphy in his multidimensional phygital drawing practice. For example, resonant sound has long been appreciated as an investigative medium by both artists and archaeologists. In his *Dragan Map/Sonic Stratigraphy Series* (2017), Gant has replaced the paper sketch book with a digital support (Figure 10). This artwork is a collaborative drawing which emerges from the artist’s renegotiation with his own discipline while embracing a pluralistic and transdisciplinary approach to create an expanded field of drawing. Acoustic signatures, displayed as sonic spectrographs, or sonographs, were recorded by Gant as the excavators’ cleaned back and defined an archaeologically recognisable surface. The graded tonal ranges in the sonographs reflect the rhythmicity, cadence, and gestures of the workers, imbued by the tactile intimacy of their conversations with the emerging surface. They also give voice to the deposits and tools. Specific tools applied on different layers exhibit distinct tones and frequencies, and the marks etched onto each digital layer create an extended drawing revealing the excavators’ rhythmical encounters with the physical surface. Here we see the distinct sounds of about 8,000 individual recorded trowel scrapes digitally draped over the measured topography (i.e., a DTM) of excavated surfaces like a diffractive acoustic membrane.

The diffractive surface patterns generated through the sonographs extend the notion of drawing through the monochromatic detail and release a musical land timbre, and the suspension and gaps between the topographies relocate these explorations of landscape into a remediated sketchbook. On screen, the

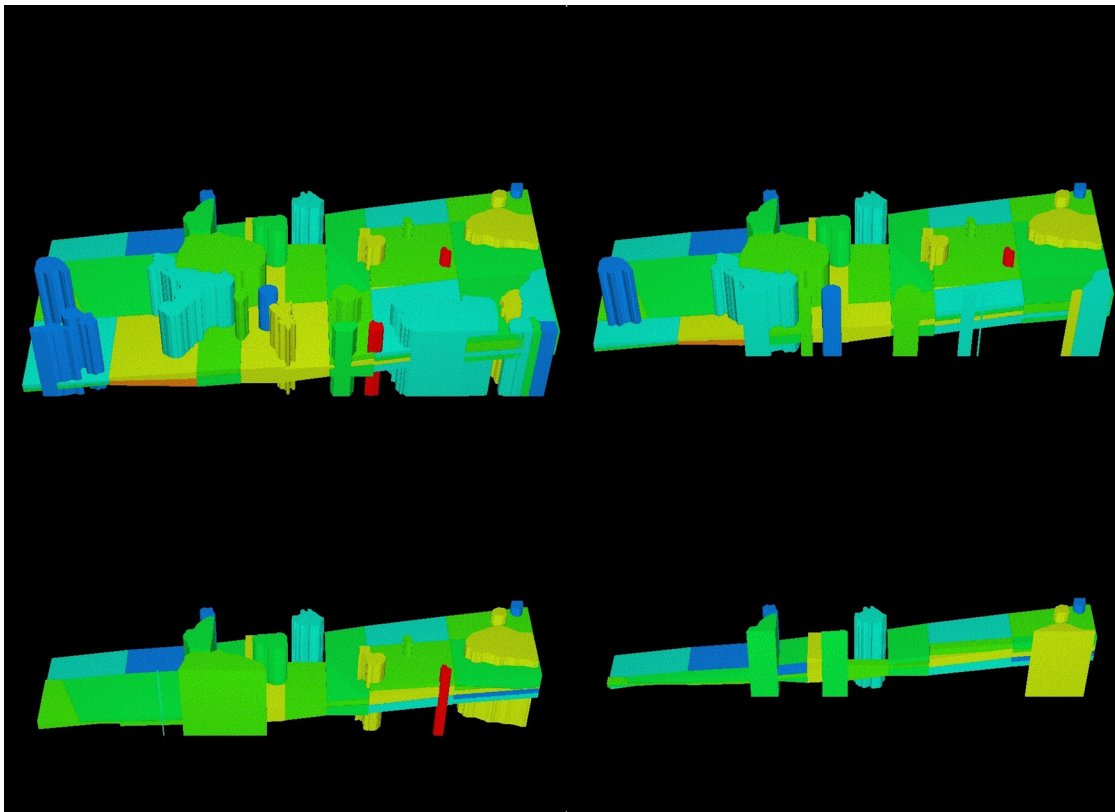


Figure 9: A sequence of CSG-modelled sections in which contexts are extruded to intersect with spatially defined archaeological components in overlying deposits (after Reilly & Shennan, 1989).



Figure 10: *Dragan Map/Sonic Stratigraphy Series* Gant, S. (2017). Courtesy the artist, copyright.

layers are separated, but within the GIS they are a bound volume. When superimposed, these interactive conversations create *sonic stratigraphies* (Gant & Reilly, 2018) which begin to expand the practitioner's physical relationship beyond a superficial two-dimensional linear enquiry that just scratches the surface and starts to develop into a deeper exploration of the three-dimensional subsurface volumetric registers of the archaeology still in the ground.

Other modes of translation can also enable us to capture and deepen insights into the dexterous movements of experienced trowelling through vibrant matter, something Ruth Tringham and colleagues evocatively describe as “hand-ballets” (Tringham, Ashley, & Mills, 2007). Gant had made extensive pencil studies of hand-trowel movements of individual workers in his sketch pads. It became apparent to Gant and Reilly (2018) that the radiating patterns of trowel strokes of archaeologists are direct equivalents of the pencil “gamuts” of fine artists studied by art theorists (e.g., Rawson, 1969), and that both could be analysed in a similar fashion to reveal the practitioners' expertise and, in the case of the archaeologists, their ability to tune into the surface. Gant developed this insight by combining numerous studies of individual workers' trowelling actions, made around the site, at different stages in the excavation, into much more widespread and multi-actor “complex layered gestural studies” (e.g., Figure 11) in which each and every line is a residual observed trace of an entangled trowel, a gesture, and an exposed archaeological surface being simultaneously inscribed and erased. These gestural studies capture the nonconscious improvisations of the diggers on site. They are a testament to their skillful craft work.

Ever more sophisticated studies emerge in Gant's evolving phygital practice. In his award winning 2018 work *Phygital Palimpsest* (Figure 12), Gant translated archaeologists' trowelling actions into a highly complex digital drawing. Numerous pencil drawings responding to the archaeologists at work were made from the edge of the trench. Later, these pencil drawings were digitised and integrated with satellite data and photogrammetry gathered by the archaeological team. The resulting imagery is worked into a multi-layered representation of excavation surfaces in order to arrest your attention and draw you in. Pencil is once again translated into pixel, retaining a trace of the hand of both artist and archaeologist (see also Morgan & Wright, 2018).

For the archaeologist, sonographs and gestural studies can be reconceptualised as a form of non-verbal, but attributable, acoustic and visual paradata recording the performative palimpsest of the excavators. In the same way, as archaeologists can recognise the artistic skill of the maker in the artefacts they uncover, a fine artist can appreciate the skill of the archaeologist uncovering the artefact. As Gant developed his enquiry by building up marks on both paper and digital supports in response to the gestures of the excavators, he was also bearing witness to the simultaneous erasure and reinscription of a continuously reducing archaeological surface and a growing void. These acoustic entanglements are on the verge of breaking through the empty topographic “shells” produced by the digital scanning and Structure from Motion (SfM) photogrammetry. The changes in tone and frequency remind us that each individual excavator is also constantly negotiating with vibrations through the core of the contexts and not just the

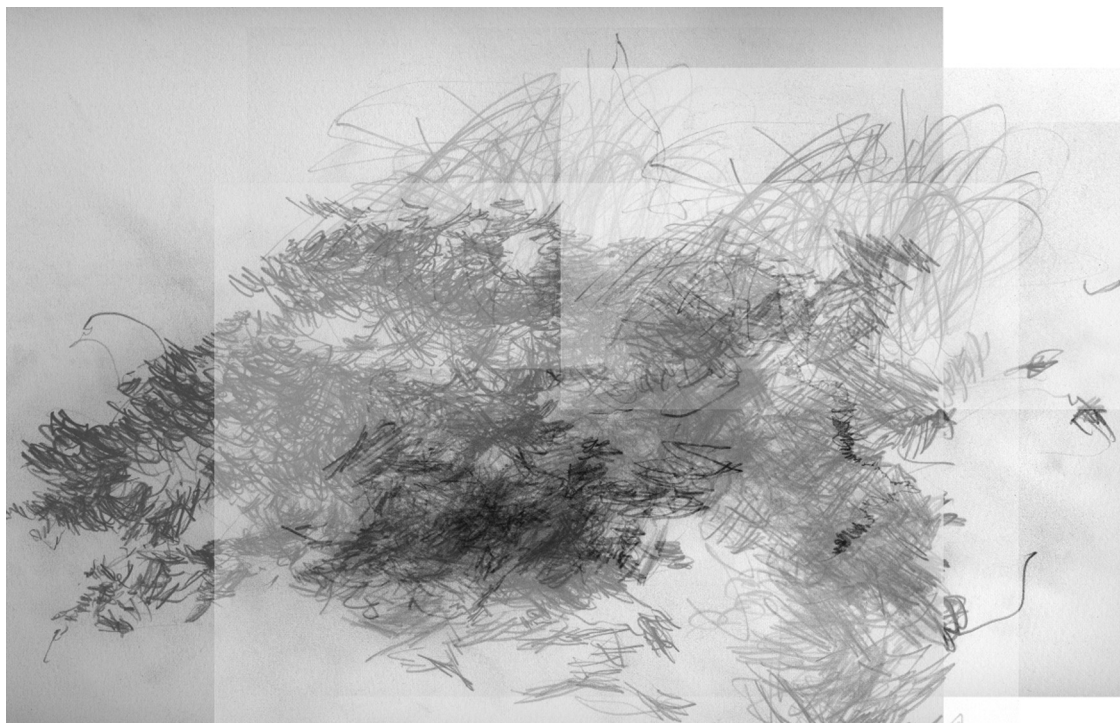


Figure 11: *Trowelling Actions: Layered Gestural Study*, Gant, S. (2018). Courtesy the artist, copyright.



Figure 12: *Phygital Palimpsest*, Gant, S. (2018). Courtesy the artist, copyright.

“recorded” interfaces, which could be characterised as topographic pauses in the action. The gestural studies we have shared so far have captured the overall movement and phrasing of these hand-ballets, but the timing of each individual movement, and the consequential growing depth of the void, is more difficult to discern. A change of perspective is required to enhance our understanding of the excavators’ embodied intra-actions with “the archaeology” in the ground.

Voids is one of another series of Gant’s (2014–2017) that also triggers a gestalt shift in our perception of an unfolding archaeological excavation (Figure 13). Here, he is again responding to the trowelling actions of excavators in the context of the developing negative space of the trench. The drawing like the trench is emergent. His drawing processes reciprocate the procedures of the excavators, re-enacting actions in the removal of soil which he reinstates as thick layers of graphite on paper. In this image, the “void” has been filled with art/archaeology gestures of *linear phrasing* and both conscious and nonconscious knowledge. The multi-layering of criss-crossing suspended lines and their associated stratigraphies are generated by hand, graphite, rubber; recursive gestures. They instantiate, once again, myriad actions of inscribing and erasing; slicing, scraping, and dragging; in short, the peeling back and removal of material. We are getting closer to realising Helen Wickstead’s notion of being able to excavate the relative stratigraphy of the gestures, traces, and marks of the working archaeologist (Wickstead, 2013, p. 561).

With this in mind, we turned to other non-standard modes of translation, aiming to introduce more nuanced aspects of the spatiotemporal dynamics of excavation into this expanding art/archaeological assemblage to deepen our insights into the embodied practice of trowelling. The sequence of trowelling actions or “gamuts” that emerged as Reilly and his colleagues defined a series of deposits and features were videoed. By examining each frame in the video, Gant could track the transits of the archaeologists’ sweeping and probing trowel gestures as they negotiated their way through the various contexts. Gant translated these hollow scour marks where the trowel intersected with the soils into solid instantiations. Each and every trowel mark was then represented in the form of a linear card strip, cut to the same length, and placed and orientated one atop another to match the original sequence of trowel strokes. The 3D studies that emerged are intriguing but standard photography does no justice to these complex entangled pieces. Therefore, Reilly, drawing on his archaeological practice, reappropriated his own trowel work via the phygital nexus and added another layer of practice into this increasingly diffractive assemblage.

Linear Phrasing RTI (Figure 14) is an investigation into plasticity drawn out in the gamut of Reilly’s trowelling gestures. In this work, Reilly’s and Gant’s combined practices have become completely intertwined through another ontological twist. Gant’s physical artwork, in which Reilly’s dematerialised trowelling marks were rematerialised in card, is now once again dematerialised and then re-expressed as a virtual object that can be interactively relit by Reilly in an interactive Reflectance Transformation Image (RTI). Here, specular rendering produces an effect that transforms the card’s visual appearance to that of a lustrous grey material. It was deliberately chosen (i.e., it is not an inherent property) to visually recall Gant’s graphite studies. At first sight, these chiaroscuro-like criss-crossing lines look like a solid, tangled, and broken meshwork. In fact, they are really part of an im(material) study of *knots* (Ingold, 2015) tracing

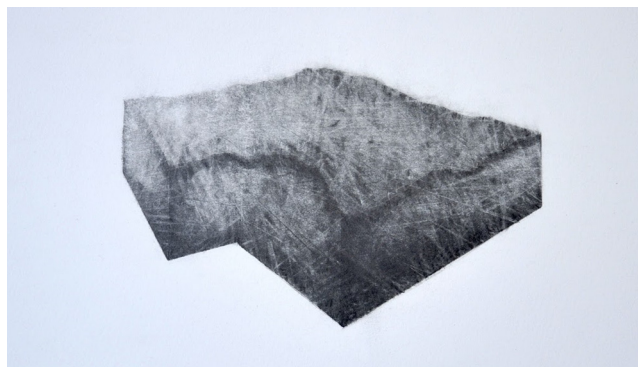


Figure 13: *Voids*, Gant, S. (2014–2017).



Figure 14: Sequence from *Linear Phrasing RTI*, Gant, S. and Reilly, P. (2016).

the moving trowel as it passes through two ancient elemental substances: earth and wind. Only the traction with earth is immediately apparent. The trace through the air in this piece is condensed into the points of contact between each successive physical linear inflexion, which also operate as another form of paradata. These paradata refer to invisible nonconscious decisions and unthought “moments of tension” (Ingold, 2007, p. 79) that occur in between “moments of completion” (ibid., p. 81), which usually pass by unnoticed in the unfolding flow, or ductus, of a looping trowel as it passes through wind and earth in turns. In short, *Linear Phrasing RTI* is a diffractive image in which art and archaeology practices have been interlaced, and then infused with non-verbal archaeological paradata to produce a collaborative art/archaeology work in which the void of the excavation is virtually refilled with the intra-activity of our shared embodied trans-disciplinary dialogue. Incidentally, another layer of gestures will be added to this phygital assemblage every time another person explores this interactive RTI. Each new user will perform a unique hand-ballet with their computer mouse partner.

4.3 A Second Provenance Illusion

We now turn our attention to the changing and tenuous nature of the paradata associated with the assemblages of artefacts that archaeologists re(dis)cover during fieldwork. Consider the flint scraper shown in the mpeg animation in Supplementary File 3. A light source is being moved around the scraper to show it off effectively. Note that the travelling harsh raking light really enhances the fine details of impact scars. Or does it? This clip is another RTI. What we are looking at is actually a digital sleight of hand. Contrary to appearances, the scraper is no longer in the frame, and it would be a mistake to assume these RTI images are simply photographs or videos. What is depicted here is a kind of mathematical mirage. The geometry and surface properties of the scraper have been abstracted into a polynomial texture map (PTM); in other words, a synthetic model. The image you are looking at is computer-generated from this model, and the scraper’s apparent materiality has become very mutable and can now be radically altered at the drop of a menu in the RTI Viewer interface. For example, Figure 15 shows the surface normals of the same model rendered in a striking colour code. This particular RTI was produced using a version of the technique called *highlight-RTI* in which the lighting is carried out manually because of constraints caused by the environment in which it occurs (Historic England, 2018). The decisions on where to position the strobe are made on the fly, intuitively, in response to the unique circumstances of the shoot. These paradata disappear, quite literally, in a flash. Importantly, the image is not a passive document. In fact, it is very “volatile” (see Beale, 2018) and many of the cognitive decisions about which parts of the “artifact” to relight, zoom in, pan across,

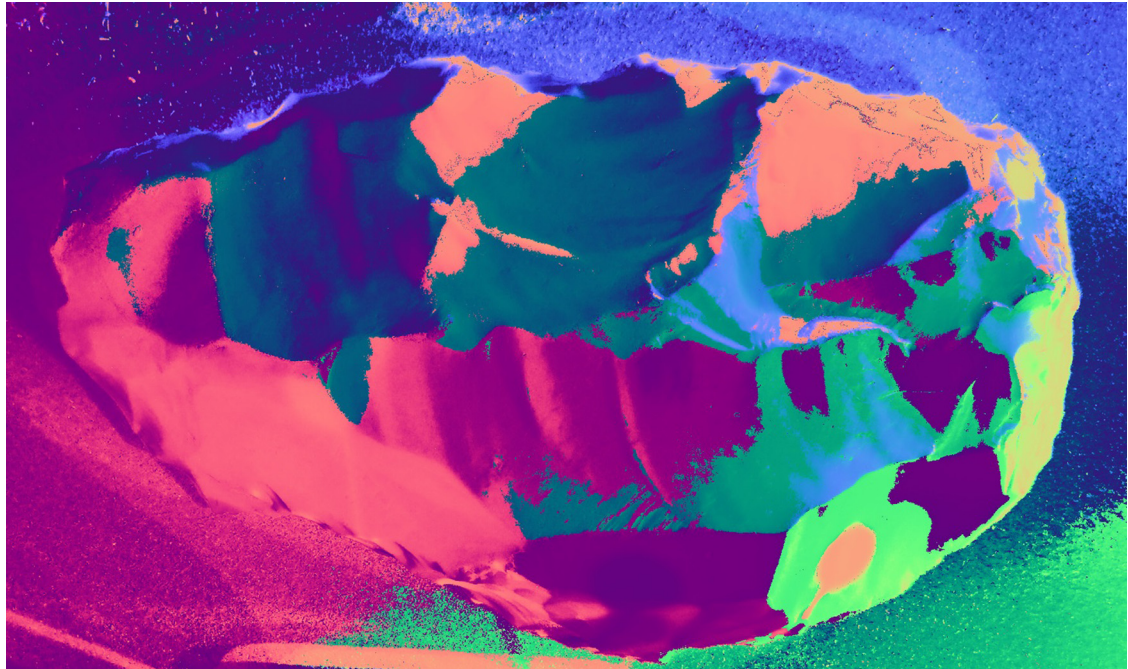


Figure 15: RTI Normals visualisation of flint scraper.

and so on, are delegated to the user of the viewing software. The opportunities for paradata proliferation are now legion with “infinitely revisable versions” (Latour, 2019, p. 17) of the RTI available. Through the lens of RTI, provenance, in terms of the life history of the digital artefact, is becoming very shaky.

Our scraper has become digitally itinerant and keeping track of the various layers of paradata that could have been collected on its journey is becoming almost an insurmountable challenge. The problem becomes overwhelming as a growing number of (re)fabrication options become available and, especially, when machine intelligences become our collaborators.

The RTI of the scraper used to produce Figure 15, which we have revealed to be a digital composite already, is also central to Figure 16. This experimental image called *#FlintFriday – Silica Alchemy I* was developed by Reilly using a computer vision technique known as “Style Transfer.” Style transfer relies on sophisticated “neural algorithms of artistic style” (Gatys, Ecker, & Bethge, 2016) using a very deep convolved neural network (Simonyan & Zisserman, 2015) to extract the style of one image and transfer it onto the content of another (for a full treatment on style transfer see Miller, 2019, Chapters 7–12). In other words, it produces a form of *diffractive image* that interlaces different styles and subjects through a machinic way of seeing (e.g., Graham, 2019). The “content image” used in Figure 15 is a frame from the compiled RTI of our scraper in Supplementary File 3. The “style image” was of a stained glass panel and was chosen as a riff on the theme of silica.

The outcome of this experiment is quite a departure from standard representations of lithic objects. It is one of a series of diffractive digital studies exploring the recursive intra-action of light, shadows, silica, and (artificial) neurons (Reilly, 2020). What is crucial to understand about this image is that the deep neural net and style transfer algorithm used here made autonomous cognitive decisions about which humans currently have virtually no conception. There is no possibility in this scenario of documenting any meaningful paradata about the detailed operational decisions associated with creating this piece. This image is born out of what Hayles (2017) describes as a *cognitive assemblage* in which both human and nonhuman forms of cognition are interlaced. Reilly chose the images, the framing, thought about the overall intent of the work, and selected his artificial intelligent collaborator. He even had a general idea of what the effect of this image hybridisation might look like, but the image that emerged through this intra-activity was still quite a



Figure 16: #FlintFriday – Silica Alchemy I, Reilly, 2020 (Diffractive Image).

surprise, as the detailed decisions on exactly where and how to apply the style transfer operations are entirely due to his nonconscious co-creator.

So far our transdisciplinary collaborations have focussed on image making. Nowadays, it is a very small step from processing static 2D digital images into interactive 2.5D virtual simulacra, and from there through 3D physical fabrication technologies such as 3D printing into a plethora of material possibilities for artefacts



Figure 17: #FlintFriday – Finds Tray by artists (Dawson & Reilly, made in 2020).

and assemblages (e.g., Reilly, 2015a, 2015b). Consider Figure 17, *#FlintFriday – Finds Tray* is part of another ongoing collaboration between Dawson and Reilly.

Dawson's practice revolves around plastics and plasticity (Dawson, 2012). At its core is material transformation, reconfiguration, and reassembly. He takes familiar artefacts or fragments – both ancient and contemporary – and skeuomorphically translates them into new materials and then rearranges them into radically new assemblages. Components are constantly broken down, rebuilt, shredded, remelted, and otherwise reformed and exchanged within fluid metabolic processes of discovery. They become hyper-residual artefacts and extreme skeuomorphs. Studio objects are also translated (back) into synthetic images, such as RTI or SfM photogrammetry, to be further transformed, reconfigured, and reprinted within other phygital iterations of these plastic exploration loops (e.g., Callery, Dawson & Reilly, forthcoming; Dawson & Reilly, 2019). In *#FlintFriday – Finds Tray* (Figure 17), a scatter of worked flints have been cleaned, had their geometries individually extracted (using SfM), and were rematerialised by Dawson at different scales and in vibrant liveries with biodegradable plastic (PLA), and then sent to Reilly to be reunited with their lithic forebears. Due to the impact of the 2020 pandemic, Dawson has had no physical contact with any of prototype flint artefacts. The point to be stressed here is that the pieces that he created are an intuitive response to the flint objects shared with him in digital formats only (i.e., RTIs and SfM compositions). We had already detected that the paradata associated with RTI images of artefacts were already beginning to fragment in the space between the maker and the interactive viewer of those digital polynomial texture mapped simulacra. Now, with these physical materialisations, all paradata are completely detachable, for the artefacts in this assemblage bear no trace of the code, or algorithms, that defined their registration and (re)making. These recursive, infinitely revisable assemblages – these extreme skeuomorphs – have effectively escaped from their provenances and their associated paradata into the phygital wild.

5 Summary, Discussion, and Conclusion

We began this paper by signing up to Ruth Tringham's call for sensorially rich, transdisciplinary research involving lateral thinking and playful exploration. We believe the projects presented here have merit in that regard. Throughout all our art/archaeology studies presented above, we have been exposing many different valencies of meaning of those key intertwined cross-disciplinary terms and concepts we provisionally defined at the outset, namely assemblage, provenance (provenience), and paradata. To accomplish this, we diffracted art practices with archaeological practices, conscious with nonconscious cognition, human and machine intelligences, sound and light, and silica knapping with plastic printing. We exposed two provenance illusions by shifting our viewpoint and changing our lens of inquiry from the epistemological to the ontological: from, for instance, "what does that section drawing or photograph tell us?" to "what are we actually looking at?" and "how, and on what basis, is it produced?" Exposing the first provenance illusion caused a gestalt-like shift in our perception of the archaeology we record in the ground. For example, are we recording what we have already excavated, as Simon Callery does with his contact paintings, or are we drawing and photographing unexcavated stratigraphy? Looking back at our spatially and temporally displaced selves in action through our subversive "heterotopic mirror," we discovered that our traditional "drawings" and "photographs" had undergone fundamental ontological shifts. In fact, both "drawings" and "photographs" have been replaced, surreptitiously, by "technical images" that could make themselves resemble their predecessors but actually resisted revealing their own additional capacities. In so doing, they entrapped their human co-producers and reduced them to the role of illiterate "functionaries." Just as technical images are not innocent, neither are the apparatuses that mediate them (e.g., Jones & Díaz-Guardamino, 2019, pp. 211–213). They too disguise how they function and obscure both their potential and limitations inside the chassises of the black boxes of so-called "cognitive artefacts" (Huggett, 2017) and "cognitive assemblages" (Hayles, 2017). As a result, formerly authoritative statements concerning authorship and authenticity, once conveyed by attributing a secure provenance, with supporting paradata, are radically undermined.

Next, by looking at what we could actually see, touch, hear, or smell in the void of the trenches, the diggers begin to reemerge back from anonymity as, for instance, in the ghostly shimmers that appeared in Gant's *Immersive Trench*. We began to apprehend their embodied practices through the echoes of their gestures and activities, through their tool marks that signal deep multimodal cognitive and noncognitive abilities. For example, Gant and Reilly discovered aesthetic sonic signatures and gamuts of authorship that refer to new categories of nonconscious auto-archived paradata for skillful, embodied, multimodal, mark-making practices. We have amply demonstrated through our art/archaeology projects the wealth of skill and creativity that is released at the trowel's edge.

In the second provenance illusion, our shift from epistemological to ontological concerns again exposed the fact that the objects mediated and recorded via the digital gaze of the practitioner's "camera" are also being replaced by an increasingly poorly understood cognitive assemblage in which additional conscious and nonconscious cognitive operations are interlaced. On the face of it, they look quite familiar, and we may once have convinced ourselves that we knew what we were looking at. However, these images disguise many hidden dimensions and affordances. For example, we revealed the very synthetic aspects of RTIs and Style Transfer images which represent a new emerging generation of "ontologically complex constructed images" (Jones & Díaz-Guardamino, 2019, p. 213) that are, particularly in the area of artificial intelligence, becoming increasingly autonomous of their human co-makers. It seems that we are becoming increasingly ignorant about our digital collaborators. The image and the print have emerged as the loci of enfolding and unfolding processes that can both deceive and enlighten us. Neither medium should be thought of as some kind of static record of an object, place, or event. As John May alerts us: "If we continue to think of images as simply more efficient drawing, or technical enhancements of otherwise undisturbed orthographic life – we will continue to drift in an ocean of simulations for which we have no compass or concepts" (May, 2019, p. 108). These dangers are multiplied and magnified once an archaeological assemblage has been extended with a technical image that then escapes into the phygital. This is especially true of the new material expressions of assemblages of artefacts that are now possible through modern fabrication technologies, such as those implicated in Ian Dawson's extreme skeuomorphs.

We therefore must agree with Perry (2015) that the high-minded ideal of attempting to document paradata in order to provide transparency in our phygital assemblage making activities is futile. It seems to us that more of our disciplinary efforts need, instead, to be focussed on understanding the nature and properties of the phygital translations that become standard archaeological practice. Here, we concur with Jeremy Huggett that "a focus on ignorance encourages a greater degree of honesty in knowledge creation. Indeed, the mistaken illusion of knowledge – the things we think we know but do not—is arguably a greater threat than the unknown knowns, known unknowns, and unknown unknowns. In this light, ignorance is a virtuous condition for inquiry and a foundational aspect of knowledge" (Huggett, 2020). Accordingly, in our art/archaeology collaborations, we approach our studies from an entangled position of unknowing, or ignorance, alert to "unknown unknowns" and "mistaken knowns." An art/archaeology approach allows us to subvert and dismantle our own established practices, methods, tools, techniques, and outputs to challenge (trans)disciplinary conventions and identify "mistaken knowns" which when exposed can be tackled by further, more robust, (trans)disciplinary consideration. Our art/archaeology diffractive images and prints require new skills and modes of viewing and interpretation to be developed. We intend to borrow a phrase from Richard Siegesmund and Kerry Freedman (2018, p. 39) that "[t]hey are a provocation." They should provoke us to look more closely at the archaeological world around us, how we intra-act with it, and its ongoing presentation. We are buoyant and optimistic about the prospects for diffractive, transdisciplinary, approaches to art/archaeology, which continue to enchant (see Perry, 2019). We celebrate the creative and skillful craftwork and embodied knowledge of experienced practitioners of field archaeology and contemporary fine artists.

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