



Authenticity and cultural heritage in the age of 3D digital reproductions

Edited by Paola Di Giuseppantonio Di Franco,
Fabrizio Galeazzi and Valentina Vassallo



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McDONALD INSTITUTE CONVERSATIONS

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Fabrizio Galeazzi and Valentina Vassallo

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Chapter 4

Digital heritage objects, authorship, ownership and engagement

Stuart Jeffrey

In this chapter I will discuss how the shift from analogue representations of the past, be they of real or imagined, sites, objects or activities, to digital representations of the same, brings with it new challenges. I will focus particularly on where these representations are intended to engage broader, non-professional and non-academic audiences. The ways in which digital representations of the past are created and disseminated needs to be carefully considered if they are not to appear sanitized, unengaging and even potentially distancing. How we construct the past is intimately linked with the nature of the representations we use in the construction process, and the apparent immateriality of digital objects creates new forms of relationships between the representation and audience. This consequently leads to new relationships between the audience and the part of the past that the digital object is intended to engage with. An important debate around authenticity (with its multiple forms), particularly the auratic quality that an authentic object manifests, focuses on the migration of this quality from the original to records and representations and whether this process applies to digital as well as physical reproduction. Latour and Lowe (2011) building on Walter Benjamin's concept of 'aura' (1969 [1936]) suggests that physical replicas and reproductions can indeed acquire authenticity, but that this is dependent on factors such as intentionality, quality and the expenditure of resources. Other research suggests the network of relationships engaged in their creation also acts in the production of authenticity (Jones 2010; Jones & Yarrow 2013; Macdonald 2013). However, there are other inter-related factors that further complicate our conception of what is authentic, these include changing modes of ownership and authorship and the apparent transience of digital records. Such factors working together also have a bearing on the auratic quality of a digital object (or the absence of this) and in turn on

its perceived authenticity. While similar issues have arisen in one form or another as new technologies for recording and representing the past have emerged as discussed in Benjamin's seminal essay on the aura in the age of mechanical reproduction (1969 [1936]), the shift from analogue to digital resurrects these issues and, due to the stark differences between mediums, accentuates them. For the purposes of this chapter it is digital heritage objects that are based on a three dimensional record, a digital reproduction, that best illustrate these issues and the focus remains on the sense of authenticity that relates to a person's emotional as well as intellectual engagement with the object, i.e. it is the form of authenticity that is not predicated entirely on a records apparent precision, objectivity and accuracy as suggested by some (Gartski 2016; Gillings 2005; Rabinowitz 2015). At the heart of these issues is how we feel about a particular representation and the impact this then has on our feelings about, and understanding of, the subject of the representation. In the following sections I will discuss the issues of authorship and ownership as well as the impact of technical issues affecting the longevity of digital objects and finally I will discuss what some of the implications are as the technology for recording and representing the heritage develops in the future. It should be noted that with each of the factors under discussion there are also practical, ethical and ideological drivers towards changes in practice, but in this chapter I will try and explore how they impact on our perception of the object, its aura and authenticity, irrespective of these other concerns.

Authorship and ownership

There are two closely related aspects of any digital object that, while apparently abstracted from its intrinsic value as a record or representation, do in fact

strongly act upon how these objects are received by their audiences. These are firstly, authorship, i.e. who created the record or representation, and secondly, ownership, or the question of who legally controls the object. Authorship was explored recently in a community co-production project called ACCORD. The ACCORD project, funded by the AHRC, ran from 2013–2015, was led by the Glasgow School of Art with partners from RCAHMS (now Historic Environment Scotland), Archaeology Scotland and the University of Manchester. Working with a number of community groups, this project specifically looked at the relationship between the intentionality and authorship of 3D record production and the perceived authenticity of the subsequent model. Through this research programme insights were gained on the value of the 3D recording as form of rapid ethnographic intervention and the way that the networks of relationships that manifest in the production process also impact the reception of the created digital object (Jones et al. 2017). The project methodology focussed on the use of co-design and co-production in order to explore these networks (Jeffrey et al. 2015). One of the key lessons of the ACCORD project with regard to co-production is not simply that the issues of who creates a record, and why, are important in its consumption, but that for this to have most effect, the identities of the producers have to be explicit. This means that the authorship of the record (or model, or reconstruction, or derived work) has to be fully acknowledged for the benefit of co-production to become apparent.

This highlights an interesting opposition to the majority practice in the production of digital heritage objects as it currently takes place. Due to the presumed importance of stamping a record with academic or institutional authority and the complication of multiple authorship (i.e. production by teams), direct naming of the actual individual authors is often deprecated in favour of an institutional marque. In this way digital objects are essentially branded as being the products of organizations and institutions and the names of the individuals responsible are relegated to contextual information or metadata, or are entirely absent. This is a significant statement on both the power relationships between the actual data creators and their host organizations and, perhaps more importantly, the way in which the digital objects themselves are conceived by those organizations. It has long been noted that the digital medium retains powerful overtones of science and technology (e.g. Huggett 2004) and that the processes of digital recording and computer modelling first grew out of technologically focussed practices such as survey, design and construction. However, it has also been noted that the creation of digital

representations of real world sites and objects and, in particular, reconstructions of imagined past sites and objects actually requires a series of decisions to be made that are ultimately more or less subjective or interpretative (Cameron 2007, Jeffrey 2015). In essence the production of a digital record can be seen to be as much as creative process as it is a technological or mechanical process. Artefacts conceived as creative outputs, i.e. works of art, most often explicitly reference an author and this in turn allows their audience to situate the work in the context of an author's other works, perhaps helping them to understand nuances, but also allowing them to attach notions of authenticity to the work irrespective of whether it is a copy or not. While literary critics have argued that a focus on authorship is a lazy and restrictive way to interpret a creative work (Barthes 1977 [1967]), it is still an important feature of how most people consume creative outputs and effects their conception of what is an authentic work. For example, a digital copy of a film by a particular director e.g. Michael Powell, is still an authentic Powell film irrespective of whether you are viewing an analogue master copy on celluloid or a digitally re-mastered version (there is of course a separate argument regarding the authentic cinematic experience intended by the director versus the individual or small group TV viewing most likely today). Forms of authenticity then reside both in the media and in authorship. The act of assigning an author to a work is also an important statement of the level of human intervention in its production. It counters the somewhat spurious idea that a digital record is the result of an entirely objective and/or automated process in which the creator is essentially a machine operator rather than an active participant. Where a discipline, for example archaeology or heritage conservation, already has a mixed, and sometimes conflicted, status somewhere between the arts, humanities and the hard sciences, it becomes a charged decision whether or not to embed an assignation of authorship within the object in question. On the one hand it could be argued that assigning authorship, and admitting the creative nature of the record diminishes the objects status as an 'authentic record' in terms of machine generated precision, on the other it could be argued that authorship enhances the authenticity of the digital object by connecting its audience with its creators while simultaneously acknowledging the creative nature of the production process.

There is a further and perhaps more important consequence of making the authored nature of digital objects prominent and this relates to the apparently sanitized nature of this class of object. In the analogue world there is a desire to be close to an important site

or object, physical proximity enhances the experience of aura, this was commented on in Benjamin's seminal work where photography is discussed in terms of a desire to bring the subject of the image closer to the viewer (Benjamin (1969 [1936])). Similarly for physical replicas of real world objects there is always a chain of physical connections that, at least conceptually, leads one closer to the original. For example, in the case of plaster casts this chain leads back to the moment of physical contact with the original object. Each further generation of cast (i.e. a copy of a copy) can be said to extend that chain of proximity, but also to attenuate the sense of connection back to the original. In this way a third- or fourth-generation copy might be considered less authentic than a first, both in terms of a technical authenticity (inaccuracy emerging in the copying process) and in terms of the sense of proximity to the original that a first-generation copy might engender. Despite this, depending on their biographical trajectory even later generation replicas can themselves acquire a form authenticity (Foster & Curtis 2015). This also applies to replication processes where the technical attenuation is minimal, such as analogue photographic prints from an original negative, early prints in a numbered sequence somehow remain more highly valued than later ones. Strangely perhaps, this valuing of early links in the chain continues with digital print runs. However, I have argued that in the domain of digital heritage objects the chain of proximity between the original and the digital appears to break, with an isolating and sanitizing effect (Jeffrey 2015, 145). The non-contact nature of many digital recording technologies such as laser scanning, structured light scanning and photogrammetry is a real virtue for the conservation professional. However, this feature in combination with the immateriality and essential weirdness of the resulting digital object (Jeffrey 2015, 146) conspire to obscure any sense of a physical chain of connections back to the original. For broad audiences it becomes difficult to conceive of the physical connections that take the audience back to some moment of human presence associated with the original object.

Adding to this sense of disconnection from the original are the limited modes of embodied engagement with a digital object. Whereas an analogue photographic print might arguably operate to bring the subject of the image closer, interactive digital objects are only ever presented behind glass, through a screen, effectively an impassable barrier between us and the object. Immersive Virtual Reality (VR), although obviously still presented via glass screens (albeit mounted near the eye and harder to perceive), does seem to offer an alternative to the sense of trying to reach through the glass. Where it is well executed and a 'suspension

of disbelief' is achieved and immersion is effective, there is definitely a sense that one is in the same shared space as the digital object (at least giving the digital object an apparent location, something it lacks whilst dormant (Jeffrey 2015, 146)). It could be argued though that rather than the digital object somehow entering the real world by breaking through the glass barrier, the audience has in fact themselves gone through the glass in the other direction. Immersive VR as a form of engagement clearly has a lot to offer especially when combined with spatially encoded sound and as a shared rather than solitary experience (cp. Augmented Reality). However it still does not overcome the lingering issues of immateriality and sanitization. Even the most advanced haptic experiences, designed to engage the digital 3D object through the sense of touch, still leave us feeling that we are engaging with the digital object as if via a bio-medical or nuclear containment glove box. Not only do they provide the user with a disconcertingly unfamiliar sense of physical contact due to current hardware limitations, but the dirt, bacteria, oil and various other substances that are the markers of contact, which leave physical traces both on an object (patina) and on ourselves, are absent. This further re-enforces the sanitized nature of the digital and further deprives it of the sense of pastness as described by Holtorf (2013). It should be noted that for some records there are ways in which the digital can break back into the material world through technologies such as 3D printing, these in themselves are not unproblematic in relation to questions of both authorship and authenticity, but are beyond the scope of this chapter (for a discussion see Reilly 2015).

In what way can authorship mitigate the sense of distance and sanitization? It has been argued that the root of people's desire to be close to an object from the past (or site or building) is not actually about the object itself, it is about a desire to move somehow closer in time to the people that are associated with that object, those who created it, used it, visited it or interacted with it in some way throughout its existence (Jones 2010, Macdonald 1997). Breaking the chain of proximity, as described above, is not about proximity to an object, building or site in itself, but rather about a sense of proximity to the people associated with them. The perceived break in the chain effectively dehumanizes the digital object, so that it cannot bring us closer too, if not actually distancing us further from, the network of people associated with the object in the past. For that digital object to subsequently be presented as essentially anonymous, acts to compound the process of dehumanization. It is possible that explicit, even celebrated, authorship can re-humanize the object, placing people back into the chain through the implied human

contact between the original object and the authors of its digital record. In this way it is possible for the digital record or representation to once again become part of the biography of the original and represent, if in no other meaning of the word, an authentic response by a creative individual or group, to the original.

The absence of authorship is also perhaps somewhat ironic in that there is a pre-existing critique of digital reconstructions that points out the disconcerting, even alienating, emptiness of representations of past cities, buildings or artefacts that are completely devoid of any representations of humanity (see Pujol-Tost 2016). Historically there are number of reason for this, but is primarily due to the expense of populating a scene with avatars, the ethics (or simple unwillingness) of doing so when dress, social stratification, behaviour etc. are so little known, and the arguments over whether or not the infamous 'uncanny valley' actually exists (Murgatroyd 2008). The irony lies in that the dehumanization of the represented scene in the past is mirrored, for very different reasons, by a dehumanization of the object in the present through deliberate or unconscious anonymization.

Just as authorship and intentionality can be made to work together to encourage an audience to engage with a digital object in a way beyond simple intellectual curiosity, the question of ownership has the power to do the opposite. It is important to draw a distinction here between ownership and copyright. For both real world objects and digital objects it is perfectly possible to own them, or an individual copy of them, without owning copyright, i.e. the right to further copy or distribute. This long standing legal position may be further complicated by attaching specific prohibitions to how items can be used via licensing of copyright material.

One of the simplest ways one can associate oneself with a cultural object or work of art, and thus feel closer to its creator, is to own a version of it. For example, a digitally encoded piece of music or a digitally encoded film. Until recent years this form of ownership has been manifest via possession of a physical object, perhaps a CD or a DVD, these objects existence and one's ability to own them, at least for personal consumption, is undoubted. As mentioned above, the ability to copy or distribute the content is an entirely a separate issue, but it is clear that the physical object that contains a digital representation of cultural artefact can be truly owned, it can be marked, it will age, it can be sold or given away and ultimately it can be destroyed. Its physicality provides a medium through which its biography can be read as it degrades over time or is moved from place to place, now on display, now hidden away in a cupboard, now sold and now destroyed. All the time the biography of the physical

object, containing the cultural artefact, is entwined with the biography of its legal owner. Buying the object, creating ownership, is a powerful transaction that binds the object, conceptually as well as legally, to its owner and brings the owner closer to both the physical artefact and the content it contains through a shared life from the point of purchase. Even if the content is only consumed via broadcast or via download, the fact that there exists a physical media that is owned binds the owner more strongly to the content. This may well be a particularly capitalist expression of the desire to be close to the original object, but it is not only the financial exchange that draws the owner closer, but the ability to handle and exercise control over a physical object that is, without the hardware to access it, simply emblematic of the content itself.

This situation is changing, globally and in a rapidly growing number of domains, our concept of ownership or even of possession, is transforming as modes of dissemination in the digital, and the physical world, become challenged by the demand for more and more control of what we consume and how we consume it. It is becoming the norm that digital content in particular is only ever accessed under licence for a particular moment of consumption. This is exemplified by streaming audio and video content, but actually extends into download content such as books on an eBook reader, which we might think we own, but in fact do not (see the case of George Orwell's *1984* as reported in the *New York Times* (Stone 2009)). This new mode of non-ownership even extends to physical objects, objects that contain Digital Rights Management that is intended to, for example, protect the copyright of software embedded within it. From 'phones to motor cars, you may think you own it, but in multiple jurisdictions you will be breaking the law if you change or even try to access certain elements of it (McSherry 2015), somewhat altering what the concept of ownership actually means. The result is that we are beginning to struggle to actually own things in the way we once understood. This is not a manifestation of a utopia which renders ownership redundant for the benefit of society, rather, it is a process of concentrating the full rights of ownership in a smaller group of hands. Ownership has become even more entangled with and deeply entrenched with those who own the means of production. This is clearly an issue for society at large and one likely to be exacerbated by the so called 'Internet of Things' where copyrightable software will reside in many more physical objects than they do now, changing us further from owners to licensees (McSherry 2015). Specifically in the domain of digital heritage objects, the status of ownership is already linked to authenticity as this is often considered

as being constituted in part through regimes of value associated with authorizing institutions (Cameron 2007, Deger 2016, Fyfe 2004, Lindholm 2008). Here the consideration is not about that authority that the original owner imparts to the object, but the ability of the act of possession itself to act on our perceptions of an object. For digital objects representing the past, one sense in which it was possible to use physical versions of digital artefacts to experience closeness, however attenuated, is through possession of a copy, even when that copy has no financial value, i.e. freely available for download. This represents a challenge for organizations that hope to generate income from, or to maintain institutional authority over their digital heritage objects through the control of each instance. Individual ownership is being eroded by confusing, even contradictory, claims to copyright and restrictive licensing that call in to question any sense of ownership one previously might have had. Ownership is being transmuted into a temporary right of access and re-use for specific purposes and with it the sense of closeness to the content that ownership engendered is being transmuted into a sense of anxiety that by some small action you may be breaking the rules and one's right of access may at any time be rescinded by the objects true owners. This can be a disempowering rather than empowering experience, it calls in to question one's ability to experience a closeness to the original by meaningful act of ownership. The debate between open access, and open licensing regimes versus restrictive licensing and intrusive Digital Rights Management, can very easily be characterized as ideological, in reality it extends beyond the ideological by acting on the nature of our perception of the objects in question, including digital cultural heritage objects. If there is overly tight control of access and the types of use and reuse of these objects, the closeness implied by ownership becomes impossible and they become, in a sense, unobtainable.

Transience

There is a well understood range of technical issues that can be seen to apply to the longevity of digital objects. The spectre of a 'digital dark age' arises (Kuny 1997), is somewhat addressed and then later arises again in a new form (Jeffrey 2012). An important truth to acknowledge with regards all digital data is that despite their apparent imperviousness to decay and the apparent ease in with which digital originals and a potentially infinite number of perfect copies can be easily stored and accessed, in practice they are in fact fragile, costly and labour intensive to curate over long periods of time. The technical reasons for this,

and indeed the technical solutions to these problems, including data integrity (e.g. error detection and correction), are discussed elsewhere (Niven 2013, Niven et al. 2012). However, it is not being overly pessimistic to say that this remains a serious issue in the field of digital heritage and digital archaeology. It still often remains the case that more attention is paid to data capture and data creation than is routinely paid to how that data will be maintained in the long term, and where and how stable points of access to the data will be. At its most basic this problem is exemplified by the plethora of dead hyperlinks that litter the World Wide Web. Unfortunately it is still a common experience to follow a hyperlink to a '404' message and it is a particularly unfortunate if that link used to go to a well-used and valuable resource, that has apparently simply disappeared. This is made even more pertinent if you have no rights of ownership over that resource and have been forbidden from owning a copy (see above). To a large extent this problem has been mitigated by the implementation of permanent addressing systems such as Digital Object Identifiers (DOIs, <https://www.doi.org/>), which rely on an authorizing body and in which commitment to long term maintenance of the digital object is an explicit feature. At the other end of the spectrum from a broken hyperlink, the same issue is exemplified by large scale datasets, scans, models and analysis that have been 'backed-up' but never actually archived. The original creators, over time, change organizations, the organizations themselves, merge or disappear and the responsibility or interest in maintaining the datasets dissipates and if no suitable host can be found, or if there is not enough metadata for meaningful archiving, or there are simply no funds available, the data languishes until its ultimate loss through hardware failure or deletion from the cloud. As mentioned above the means of addressing these issues are well understood, perhaps less well understood, or at least less frequently considered, is the effect ownership anxiety and disappearing objects have together on the way digital objects are considered by the user. All the weirdness of the digital object, its immateriality and its physical unlocatability are further accentuated by its apparent transience, or at least the suspicion that it might be transient.

A key feature of physical heritage objects is the fact of their survival over long periods of time. This longevity and the richness of human associations that it implies is a defining feature of its auratic quality. Latour and Lowe and others have discussed how, in practice the auratic quality of the original can migrate to its copy (2011), including digital copies/records (Cameron 2007, Jeffrey 2015), and indeed new forms of authenticity relating to the networks of relationships

around a digital object can be created. However, unless a digital object is specifically intended to be temporary, all of the arguments regarding their aura and authenticity are entirely undermined if the digital object being created is either perceived to be, or is in reality, an unreliable object. The long term existence of a digital object and the permanence of points of access to it speak powerfully of the value ascribed to it by its creators.

Future recording

Looking just a short way into the future there are two areas in which conceptions of authenticity and the directly linked conception of the auratic quality of an original will be further challenged. The first change will be the continuing drive towards the automation of the digital recording process. While I have discussed above that currently digital recording of cultural objects in three dimensions remains both skilled and highly interpretative, the trend is towards both automated processes and integrated workflows. With Structure from Motion (SfM) the inevitability of ‘robotic’ capture (e.g. with drones or swarms of drones) and real-time processing of the imagery they generate mean that the greatest operator challenge will be specifying the building or object to be recorded. Autonomous or semi-autonomous hardware and integrated software workflow will then deliver a 3D model of the target fully formed with minimal user intervention. Similarly the deployment of time of flight laser devices or structured light devices using visible and non-visible parts of the spectrum will be married with mobile robotic platforms that require targeting, and little else, before delivering surface models with integrated textures for their operators. While it might be argued that the likely cost associated with new devices and systems will keep them firmly in the domain of experts, this will not necessarily be the case. SfM can in many instances produce a similar quality model to a laser scan at a fraction of the price. It is also true that the quality of 3D record that will be generated from consumer grade hand held devices in future might well match or surpass the quality of today’s most exclusive technology, at least in terms of accuracy. What will remain, what is unavoidable, is what we fail to value highly enough today, namely the sequence of creative decisions we make on how to use a 3D record to create a meaningful representation of the past. The knowledge, experience and skills required to do this become apparent when we consider the impossibility of this stage of the visualization process being automated. While there is an undeniable level of technical skill required to create 3D models of complex real world objects, there is also

a large degree of creativity, interpretation and even artistry. In future it will become harder and harder to deny this in favour of a self-defined formulation of the recorder as a technician.

As well as further automation of data capture there is likely to be an increasing drive towards data rich models, these are representations of the past that are not simply visual, or even sensual, but are specifically designed to act as points of integration for other, spatial and non-spatial, datasets. This concept is emerging from, among other sources, the field of Building Information Modelling (BIM) and ‘Heritage BIM’ where complex datasets are associated with 3D models of historic buildings (Fai et al. 2011). Currently the focus on of this kind of model is the integration of technical datasets, but there is no reason to discriminate against the wide range of heterogeneous datasets that might be of interest to various audiences, from archival texts and images to expressions of contemporary social value. Indeed this holds out the further likelihood that 3D visualizations of heritage objects will no longer be isolated, free floating entities disconnected from other forms of data, but become integrated within a broader cultural heritage data ecosystem. This integration process in itself could well create a new series of challenges to our conception of the aura and authenticity of the digital object as it transforms from static representation linked only to its real world original to a dynamic exploratory tool linked to multiple other datasets.

Conclusion

It has been argued that we are at a moment of crisis, even a permanent crisis, with regards to the authenticity and aura of digital objects (Bolter et al. 2006). Authorship, ownership and transience all act as additional complicating factors on our understanding of the impact of mechanical and digital reproduction on aura. I would argue that we are still at the early stages of understanding our relationship with the digital world in general, and that understanding will emerge from practice. We clearly value a sense of the authentic and actively seek out objects with an auratic quality. Because both aura and authenticity are part of the way we understand and engage with the world around us, it is hard to conceive that our experience in the future will be one where these qualities are entirely absent. It has been argued that new forms of aura and authenticity can arise in replicas and representations not only through attention to intentionality, value, quality and relations, but also through consideration of authorship, ownership and transience. Each of these represent opportunities as well as challenges. We can think of narrowly focused,

anonymous, restrictively licensed and ultimately inaccessible digital objects as being inappropriate for broader audiences. Not just for technical reasons, but because of how they might discourage this audience from engaging with them at any level beyond passive consumption. An emerging alternative approach would see a digital heritage object that is produced for a specific audience (or better, co-produced with them), free to use and re-use for any purpose, clearly creative, explicitly authored, and reliably and permanently accessible. Such digital objects leverage the networks of relations involved in their production, they allow them to be valued through unfettered possession, they re-humanize them and render them reliable objects in the world. It is fair to say that the process of creating objects with these qualities may still encounter a number of practical problems. However, by paying attention to these qualities, digital heritage objects created and delivered in this way have a far higher likelihood of not only mitigating the issues arising from perceived inauthenticity or absence of aura, but facilitating the creation of these in new forms associated with both the representation and the original.

References

- Barthes, R., 1977 [1967]. *The Death of the Author*. Image / Music / Text. Trans. Stephen Heath. New York: Hill and Wang, 142–7.
- Benjamin, W., 1969 [1936]. The Work of Art in the Age of Mechanical Reproduction, in *Illuminations*, ed. H. Arendt, trans. H. Zohn. New York: Schocken Books, 217–51.
- Bolter, J.D., MacIntyre, B., M. Gandy & P. Schweitzer, 2006. New Media and the Permanent Crisis of Aura. *Convergence* 12(1), 21–39.
- Cameron, F., 2007. Beyond the Cult of the Replicant: Museums and Historical Digital Objects – Traditional Concerns, New Discourses, in *Theorizing Digital Heritage: A Critical Discourse*, eds. F. Cameron & S. Kenderdine. Cambridge, Mass.: MIT Press, 49–76.
- Deger, J., 2016. Thick Photography. *Journal of Material Culture* 21(1), 111–32.
- Fai, S., Graham, K., Duckworth, T., Wood, N. & R. Attar, 2011. Building Information Modeling and Heritage Documentation, in *CIPA 2011 Conference proceedings: XXIIIrd International CIPA Symposium*. Accessed 15 May 2017: <http://www.cipa2011.cz/proceedings/index.htm>
- Foster, S.M. & N.G.W. Curtis, 2015. The Thing about Replicas – Why Historic Replicas Matter. *European Journal of Archaeology*, Online First, 1–27.
- Fyfe, G., 2004. Reproduction, Cultural Capital and Museums: Aspects of the Culture of Copies. *Museum and Society* 2(1), 47–67.
- Garstki, K., 2016. Virtual Representation: the Production of 3D Digital Artefacts. *Journal of Archaeological Theory and Method*, Online First (07/04/16), 1–15.
- Gillings, M., 2005. The Real, the Virtually Real, and the Hyper-real: The Role of VR in Archaeology, in *Envisioning the Past: Archaeology and the Image*, eds S. Smiles & S. Moser. Blackwell Publishing Ltd, Oxford, UK, 223–39.
- Holtorf, C., 2013. On Pastness: a Reconsideration of Materiality in Archaeological Object Authenticity. *Anthropological Quarterly* 86(2), 427–43.
- Huggett, J., 2004. Archaeology and the New Technological Fetishism. *Archeologia e Calcolatori* 15, 81–92.
- Jeffrey, S., 2015. Challenging Heritage Visualisation: Beauty, Aura and Democratisation. *Open Archaeology* 1, 144–52.
- Jeffrey, S., Hale, A., Jones, C., Jones, S. & M. Maxwell, 2015. The ACCORD project: Archaeological Community Co-Production of Research Resources, in *Proceedings of the 42nd Annual Conference on Computer Applications and Quantitative Methods in Archaeology, CAA 2014*, eds F. Giligny, F. Djindjian, L. Costa, P. Moscati & S. Robert. Paris: CAA, 1–7.
- Jeffrey, S., 2012. A new Digital Dark Age? Collaborative web tools, social media and long-term preservation. *World Archaeology* 44 (4), 553–70.
- Jones, S., Jeffrey, S., Maxwell, M., Hale, A. & C. Jones, 2017. 3D heritage visualisation and the negotiation of authenticity: the ACCORD project. *International Journal of Heritage Studies* 24(4), 333–53.
- Jones, S., 2010. Negotiating Authentic Objects and Authentic Selves: Beyond the Deconstruction of Authenticity. *Journal of Material Culture* 15(2), 181–203.
- Jones, S. & T. G. Yarrow, 2013. Crafting Authenticity: an Ethnography of Conservation Practice. *Journal of Material Culture* 18(1), 3–26.
- Kuny, T., 1997. A Digital Dark Ages? Challenges in the Preservation of Electronic Information, in *63RD IFLA (International Federation of Library Associations and Institutions) Council and General Conference*. Accessed 27 September 2016: <http://archive.ifla.org/IV/ifla63/63kuny1.pdf>
- Latour, B. & A. Lowe, 2011. The Migration of the Aura, or How to Explore the Original through its Facsimiles, in *Switching Codes: Thinking Through Digital Technology In The Humanities And The Arts*, eds. T. Bartscherer & R. Coover, 275–98. Chicago: University of Chicago Press.
- Lindholm, C., 2008. *Culture and Authenticity*. Oxford: Blackwell.
- Macdonald, S., 1997. A People's Story: Heritage, Identity and Authenticity, in *Touring Cultures: Transformations of Travel and Theory*, eds. C. Rojek & J. Urry, 155–75. London: Routledge.
- Macdonald, S. 2013. *Memorylands: Heritage and Identity in Europe Today*. London: Routledge.
- McSherry, C., 2015 Who Will Own the Internet of Things? (Hint: Not the Users), *Deeplinks Blog*, 20 January 2015, The Electronic Frontier Foundation (EFF). Accessed 27 September 2016: <https://www.eff.org/deeplinks/2015/01/who-will-own-internet-things-hint-not-users>
- Murgatroyd, P.S. 2008 'Appropriate Levels of Detail in 3-D Visualisation: the House of the Surgeon, Pompeii', *Internet Archaeology* 23.
- Niven, K. (ed.), 2013. *Caring for Digital Data in Archaeology*. ADS/ Digital Antiquity Guides to Good Practice, Oxbow Books

- Niven, K., Jeffrey, S. & J. Richards, 2012. Archiving Three-Dimensional Archaeology: New Technologies, New Solutions?, in *Archaeology in the Digital Era Volume II, e-Papers from the 40th Conference on Computer Applications and Quantitative Methods in Archaeology*, eds G. Earl, T. Sly, A. Chrysanthi, P. Murrieta-Flores, C. Papadopoulos, I. Romanowska & D. Wheatley.
- Pujol-Tost, L., 2016 Pixel vs Pigment. The goal of Virtual Reality in Archaeology in *Savage Minds* (blog). Accessed 27 September 2016: <http://savageminds.org/2016/01/11/pixel-vs-pigment-the-goal-of-virtual-reality-in-archaeology/>
- Rabinowitz, A., 2015. The Work of Archaeology in the Age of Digital Surrogacy, in *Visions of Substance: 3D Imaging in Mediterranean Archaeology*, eds B.R. Olson & W.R. Caraher. Grand Forks, ND: The Digital Press at the University of North Dakota, 27–42.
- Reilly, P., 2015 Additive Archaeology: An Alternative Framework for Recontextualising Archaeological Entities. *Open Archaeology* 1(1).
- Stone, B., 2009. Amazon Erases Orwell Books From Kindle, *New York Times*, 17 July 2009. Accessed 27 September 2016: http://www.nytimes.com/2009/07/18/technology/companies/18amazon.html?_r=0