



Technospheric Curation and the Swedish Allah Ring: Refiguring Digitisations and Curatorial Agency as Ecological Compositions, and Eco-curating as Planetary Inhabitations

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Abstract In this chapter I unravel human-centred understandings of digitisations working with the digitisation of a silver-alloy finger ring inscribed in Arabic Kufic writing with the words “il-la-lah” (“For/to Allah”) and re-theorise it through a novel ontological, new-materialisms, posthuman, ecological mode of thinking (Cameron, Fiona R. 2018. Posthuman Museum Practices. In *The Posthuman Glossary*, ed. Rosi Braidotti and Maria Hlavajova, 349–352. London / New York: Bloomsbury Academic; Cameron, Fiona R. 2019. Theorizing Digitisations in Global Computational Infrastructures. In *The International Handbook of New Digital Practices in Galleries, Libraries, Archives, Museums and Heritage Sites*, ed. Hannah Lewi, Wally Smith, Steve Cooke, and Dirk vom Lehn, 55–67. London: Routledge). The ring is significant as evidence of interactions between Viking and Islamic worlds and as an artefact directed to promoting intercultural respect during the Syrian refugee crisis and the rise of far-right anti-Muslim sentiments. Significantly, the ring digitisation also becomes planetary in reach and

distribution as an unruly, more-than-digital ecological composition in which curatorial agency is refigured as radical, eco-systemic processes involving the action and vitality of many different coordinates in their unfolding (Cameron, Fiona R. 2021. *The Future of Digital Data, Heritage and Curation in a More-Than-Human World*. Abington: Routledge., 129).

Keywords Digitisations • Digital cultural heritage • “Allah” finger ring • Eco-curatorial agency • Ecological compositions • Technosphere • More-than-human ontologies

In this chapter I unravel human-centred understandings of digitisations (commonly described as digital copies of museum collections) based on human agents, actions, narratives and object-centred forms of materiality, sociality and their accompanying social, cultural and technical frames of interpretation, as well as recent accounts focusing on digital materiality (Cameron 2021, 129; Cameron 2019, 55-56). This is because in the context of a radical expansion of data forms and types, infrastructures and technologies and their human, more-than-human and non-human aspects, digitisations become more-than-humanist forms of social and cultural expression, statements of identity or digital material substrates (Cameron 2021, 129; Cameron 2019; Cameron 2018; Cameron 2008).

In light of this, I theorise them through a novel ontological, new materialisms, posthuman and ecological mode of thinking (Cameron 2014; Cameron and Mengler 2015; Cameron 2018; Cameron 2019; Cameron 2021) by focusing on the digitisation of a high-grade silver-alloy finger ring with a violet soda-lime glass inset, inscribed in Arabic Kufic writing with the words “il-la-lah” (“For/to Allah”). Found in a woman’s burial site in Birka, 25 km west of Stockholm (Wärmländer et al. 2015, 131), this artefact, known as the “Allah” ring, is the only example of its type with an Arabic inscription found on Swedish soil (Fig. 5.1). Carbon-dated to 850 CE, the ring is in the collection of the Swedish History Museum (SHM) in Stockholm (Wärmländer et al. 2015, 131). The archaeological excavations conducted in Birka revealed many other grave goods, such as silver coins (dirham) whose material composition, decorative design elements, inscriptions and crafting methods suggested an origin in a distant location. All these artefacts, many of which come from the silver mines of Panjshir, Afghanistan, alongside those containing crystal and carnelian, provide material evidence of the multiple connections between Vikings and Islam, through sojourns in Yemen, India, Asia Minor and the Caucasus some

Fig. 5.1 The Allah ring.
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1300 years ago (Wärmländer et al. 2015, 132). Furthermore, all these artefacts point to the Birka's importance as a trading centre during the Viking era between 793 and 1066 CE (Wärmländer et al. 2015, 132).

REFIGURING THE OPTICS

In this chapter I refigure the Arabic finger ring, when digitised and uploaded to the Internet, as significant not only as evidence of interactions, analogous to its “real analog parent”, between the Viking and Islamic worlds of the past; rather, it has also become planetary in its extent as a more-than-digital, unruly, ecological composition under the influence of radical, eco-systemic processes involving the action of many different types of coordinates and the vitality of their interrelatedness in their unfolding (Cameron 2021). The parent and its digitisation exhibit different notions of humanness and human culturing as different forms and processes (Cameron 2021, 234), comprising metals such as silver and copper used in digital infrastructures and those used in the crafting of the ring itself and its distribution.

Reading the digitisation of the ring through a more-than-human and eco-systemic, rather than a humanist, framework directs our investigation into how it is composed, conjoined and transformed by the co-evolving interrelatedness of a broad range of agents from people to technologies, algorithms, materials (metals, chemicals, rare-earth minerals), infrastructures, energetic systems, ideas and so forth (Cameron 2021, 130). It also alerts us to how this conation of human, more-than-human and other-than-human forces operates together in refiguring the Allah finger ring as more-than-digital, in both its constituted and constituting forms, and as

domains of influencing within the extended, distributed webs of intelligibility that comprise it as something other than a fixed representational image (Cameron 2021, 130-131).

First, such figurations of the more-than-digital Allah ring direct our attention to the unprecedented level of digitally and technologically complex innovation accomplished and emerging; how such innovations are accelerating exponentially; the novel types of relationships that are formed between human and non-human entities; and the new curatorial forms that are emerging, which I have defined as vastly expanded, distributed ecuratorial processes and their non-linear and multifaceted domains of influencing of planetary extent wrought by these developments (Cameron 2021, 130). Second, these circumstances alert us to the emerging material, sensing and discursive manifestations of these eco-curating processes. Third, the type of knowledge that is produced through these new figurations is radically different from human narratives and at the same time is folded into all manner of entanglements and cognitive processes (Cameron 2021, 130). Feminist philosopher Rosi Braidotti (2019, 2-3) argues that these new types of knowledge, produced and distributed as a result of unprecedented technological developments involving multiple human and non-humans, emerge in a complex, posthuman convergence. Fourth, a consideration of the ring as comprising material agencies widens the interpretive potential of digital cultural heritage beyond its humanist, social constructivist and technical framing as more-than-digital (Cameron 2021, 130). It also acts as a lever to consider how the more-than-digital Allah finger ring might be conceived as imbricate material and performative indices in ecological crises (Cameron 2021, 130-131): that is, from the extraction of the geological substrates of the Earth itself in the service of the digital economy and capitalist accumulation through digital devices from computers to smartphones and infrastructures; the production of digital and electronic waste; and the burning of fossil fuel to drive global computational infrastructures, thereby leading to the contamination of terrestrial Earth and the atmospheric envelope; and the accompanying environmental destruction leading to biodiversity loss and extinctions (Cameron 2021, 248-253).

Fifth, the interpretation of digital data as heritage is not simply a case of how the Allah ring, for example, appears or is read differently by Swedish and Islamic archaeologists and historians, museum professionals and their respective communities through inclusion in plural heritage-interpretive frameworks (Cameron 2021, 130). By engaging digital cultural heritage and through the more-than-digital Allah ring example as different ways of thinking about and acting in the world that also takes account of the

accomplishments of non-humans and more-than-human entities or as different worldings rather than world views, we can move away from imposing pre-ascribed categories of material, aesthetics, form, mode of production, agency and associated points of view founded on person–thing (subject-object) relations, such as history, significance and object biographies (Cameron 2021, 130).

DIGITISATIONS AS A HUMANIST FORM

Digitisations are routinely viewed as immaterial, informational replicas of their parent, the “real analog object”, and as networked human and machine subjectivities (Cameron 2007, 89; Cameron 2019, 55). In this scenario, connecting people who share information of the real object through its digitisation continues to be the primary concern (Cameron 2019, 55). The value of a digitisation derives from its role as a form of cultural communication alongside its potential to promote the radical democratisation of institutions in regard to access to and engagement with their collections (Cameron 2007). Accordingly, users are conceived as autonomous human agents in a global infosphere (Cameron 2019, 64-65).

While material heritage is founded on an artefactual notion of identity, digitisations are founded on an informational one (Owens 2018, 13-17). In this aspect, digitisation aims to carry the cultural information and aesthetic impression of its parent (Cameron 2019, 55; Cameron 2007, 89). Digitisations are also classified as informational in a software sense (Cameron 2021, 140).

Materiality is rendered less important or indeed irrelevant by the immaterial and informational discourses occasioned by computer code (Fuller 2005, 2). And since a digitisation is subordinate to these interpretations, it is tasked to authenticate its parent, rather than itself (Cameron 2021, 37). Put simply, the digitisation of the more-than-digital Allah ring is informational; the material object is its parent and the information of the parent is encoded into the digital, considered materially as the direct transfer of atomic matter into immaterial code. Like the parent, the digitisation becomes a unique object (Cameron 2007, 89), a heritage form, constituting direct evidence of interactions between Viking Scandinavia and the Islamic world. To this end, digitisations are subject to and judged on the basis of its similarity to its material parent (Cameron 2019, 56). In museum contexts, discourses of comparison and lack from a position of negative association are the primary criterion of value for a digitisation (Cameron 2019, 56-58). But in the case of the more-than-digital Allah ring, the

value of the digitisation does not come from a position of lack, but of enhancement through complementarity, even when it is read as its parent.

The museum and heritage sectors continue to align themselves closely with the computer revolution and the so-called information turn (Cameron 2019, 55-56). In addition, the focus on ICTs and social media has largely directed museums and their digital strategies towards the social interpretation of digital heritage collections and the management of that information as its technicity, rather than towards a sustained consideration of the other unique affordances of digital collections themselves (Cameron 2021, 139).

In an object-orientated museological culture, emphasis is placed on a digitisation's role as a social text and symbols from which sociocultural insights into the past might be garnered, much like other anthropological artefacts, as described by Liana Chua and Amiria Salmond (2012, 102). Digital code, a feature central to the digitisation's identity in current debates, operates as a literature, a mechanism, a spatial form and organisation and as a repository of social norms, values, patterns and processes. Furthermore, its programmability sets digitisations apart from other simulations, such as photography and film and indeed its parent.

Strikingly but also unsurprisingly, the more-than-digital Allah ring is defined within a single dimension and in accordance with the hierarchical relations of human subject-object, thereby acting as a passive invocation of the human and social. Accordingly, this sole focus on the human subject and our interpretive needs renders invisible other ontological alternatives of thing-being. Therefore, our engagement with digitisations such as that of the Allah ring is egocentric, borne out of the intent, needs and sensibilities of the human subject: as a means of understanding cultural significance as symbolic of identity; as a memory agent; as a platform for storytelling; as material evidence of past events; and as connections between diverse cultures. Here the role of the digitisation is seen simply in terms of its aesthetic, social, historical, material, scientific or affective term (Cameron 2019, 58-59).

We commonly use informational surrogates for art educational purposes, where photographs, slides and digitisations operate as artefactual stand-ins for identifying works and art trends (Owens 2018, 1-4). This is evident from the reproduction of the Allah ring and its eco-curatorial distribution across global computational space, and its use by media outlets, such as Al Jazeera, directed, as Diab (2015) avers, "to allay fear and fear-mongering about the Islamisation of Europe in light of the refugee crisis".

Significantly, the visual, informational, rhetorical, technical and computational ecology that dominates our understanding of the more-than-digital Allah ring and its circulation obfuscates all other interpretations (Cameron 2019, 57).

The production of digitisations and discussions in this regard place a greater emphasis on the techniques of visualisation, whose role is to accurately represent the physical counterpart and, interestingly in regard to the Allah ring, to act forensically. The documentation of the ring in the museum database describes it as being of gilded silver, set with a violet amethyst inscribed with the word “Allah” in Arabic Kufic writing (Wärmländer et al. 2015, 131). These documented details of its origin, physical composition and inscription have become the subject of much conjecture. Subsequently, the visual examination of the ring and its technical analysis through non-destructive methods, as well as its 3D digitisation, were conducted to ascertain its material composition in an effort to resolve matters regarding its origin and material composition (Wärmländer et al. 2015, 131). The more-than-digital “Allah” ring as a 3D replicant sought to represent an accurate account of the material, analogue parent through multiple photographs from different angles using a digital SLR camera (Canon EOS 600D) and stitched together into a 3D model using Agisoft Metashape software (Wärmländer et al. 2015, 132). This 3D model aimed to achieve accurate scale renderings of its shape, size and details, such as the texture of the “real” Allah ring; its materials and how it was made; and enable the reading of the script etched into its glass surface. In this case, the 3D digitisation sought to amplify the parent’s physical characteristics, elements and properties, not just in terms of their informational qualities but also materially and involved the augmentation of the marks of its crafting, thereby enabling its forensic investigation by bringing forth its fine-grained details many of which are indistinct to the eye. Combined with the analysis of the parent through its atomic composition based on SEM/EDS (Scanning Electron Microscopy with Energy Dispersive Spectroscopy) imaging and elemental analysis (Wärmländer et al. 2015, 132), both forms of forensic examination drew forth the aural characteristics of the parent. As a result, the replicant merged in both meaning and material with its parent. As a human-non-human interface, its humanness is etched into its fabric with respect to both its parent and the digitisation.

Therefore, the value of a digitisation of the Allah ring rests on its ability to materially replicate its parent and to forensically examine it. It is deeply fused in its representational mode and that of its parent’s aesthetic, the

very thoughts that created its terrorist leanings. Therefore, rather than framing the Allah ring in these terms, I take a different route and interpret it in its many forms as multiple ecological compositions deeply embedded in the substrates of life itself and complicit in the very future habitability of the planet (Cameron 2021). Strikingly, and according to normative terms of reference, the ring's authenticity with respect to its digitisation is cast in terms of how accurately it represents the information of the original especially in its material properties, that is, its informational accuracy and its potential for scientific analysis. Here the digitisation emerges as authentic, but not on its own terms (Cameron 2019, 55-56). Accordingly, the cult of the replicant continues to play a defining role in the machinic distribution of the more-than-human-digital Allah ring.

Furthermore, the prevalence of systems of representation as a strategy for description and explanation within heritage and museum cultures potently illustrates and delimits the meanings and values that can be given to digitisations (Cameron 2007, 89; Cameron 2008). This applies to the more-than-digital Allah ring as historical document, as embodying the marks of its crafting, its material properties and functioning materials, and as semiotic text, rather than existing in its own right with its own set of attributes (Cameron 2019, 56). Clearly, the ring is disposed towards social constructivist and human-material significations through its parent.

THE DIGITISATION OF THE ALLAH RING AS MORE-THAN-HUMAN ECOLOGICAL COMPOSITIONS

With the development of multiple Internets, superfast Wi-Fi connections, Web 2.0, the semantic web, extensive social networks, sophisticated search queries, personalisation and mobile applications, the emergence of different types of mobile devices, digital platforms and media types such as Facebook, Twitter, Instagram and Pinterest, more and more complex forms of data production and connectivity have emerged (Cameron 2019, 56-60; Cameron 2021, 131). As technological capitalism has grown and the digital economy expanded amidst the complexity and disorderliness of planetary computational infrastructures, the rise of automation and algorithmic governance, energetic systems, cloud computing and storage, more complex platform, financial, governance and surveillance structures begin to cross sectors and disperse across scales (Cameron 2019, 59-60; Cameron 2021, 131-132). The destructive forces of data—through, for

example, the mining of vast quantities of rare-earths and metals (cobalt, gallium, indium, lithium, platinum, aluminium, tin, copper, palladium, silver) used in batteries, hard drives, displays, memory chips, electronic components and gold solvents used in connectors, contacts and wire bonding to enable rapid Internet connections, alongside toxic electronic waste dumps—have led to conflicts, resource depletion, environmental destruction across multiple life spans, and human rights violations (Reading and Notley 2015; Parikka 2015a; Cameron 2021, 132). As a consequence of coal and petroleum mining, fracking and carbon pollution through the burning of fossil fuels to drive the digital economy, climate change and the emergence of the Technosphere (a subsystem of the Anthropocene) were brought about by the evolution of technics, large-scale technology and media production which, argues media theorist Jussi Parikka (2015a, viii), become a question of geology.

The geological components in digital media devices include cobalt from Africa, zinc from Alaska extracted and refined into indium in Canada with other metals and minerals originating from Belgium, Russia, Peru, China, Congo, South Africa and Malaysia (Parikka 2015a, 46; Cameron 2021, 132). Here the non-human world previously described as Nature is enrolled in digital technical projects and infrastructures (Simondon 1989).

In a digital economy directed to the scientific understanding and economic exploitation of all living and non-living matter under the imperative of capital accumulation, these more-than-digital ecologies create new material, contaminating conditions in the ruins of digital consumption and obsolescence (Gabrys 2018, 108-109; Cameron 2021, 132). At the same time these developments are also reorganising social, geographical, economic and political life as new types of ecologically implicated conditions and blurring distinctions between humans, other species and earthly elements and processes (Bratton 2015; Parikka 2015b).

While it is acknowledged that computational infrastructures, media and data have always operated in an ecological way, I expanded on the notion of the ecological to construct a more radical and extensive account of digital cultural heritage within these ecological formations (Cameron 2021, 133).

As a result, an ever-expanding array of coordinates and subjects enters the field of things we call digital cultural heritage, both digitally born, and digitisations often mediated by AI, algorithmic culture and machine learning. Such intimate collaborations between digital media systems, technology, organic life and geological matter enlist a whole host of new

coordinates and forms of data and systems into the digital cultural heritage realm (Cameron 2021, 132). To this end, I advance new figurations for digitisations as multiple, disorderly, multi-scaled-forming ecological compositions comprising what I call thingness (the multi-scaled, extensive, radically interoperable webs of heterogeneous coordinates, forces and agencies that comprise them) that are at once complex, emergent and multivalent (Cameron 2018; Cameron 2019, 60-61; Cameron 2021, 139).

As a result, through an ecological optic that makes visible the expansive range of coordinates that comprise these productions, the human-centredness of digital cultural heritage collapses (Cameron 2021, 254). Instead, human users and digitisations operate within an ever-expanding field of coordinates and processes (Cameron 2019, 61).

The variable coordinates that make up the more-than-digital Allah ring are so extensive that they interpenetrate human and non-human life itself. The ring therefore becomes an extended and dispersed spatial and temporal composition made up of diverse, conjoined and interacting vital elements (Cameron 2019, 61). An ecological mode of thought draws our attention to environmental crises in which digital data and digital media, and consequently the more-than-digital Allah ring, are implicated.

Here the more-than-digital Allah ring and its unique coordinates are embedded, extended and distributed, interpenetrating human and non-human life itself from deep time through the geological and material substrates in which the raw minerals used in the making of hardware and smartphones are embedded in the exploitative labour practices and global supply chains from which they are made and remade (Cameron 2021, 135).

Accordingly, digital data and, by implication, the more-than-digital Allah ring can no longer be thought of as originating from a singular source in the same way we erroneously refer to the “real”. The ring is made up of diverse elements from many geographical regions. Through the extraction, harnessing and culturing of the vital, immanent qualities of metals, minerals and chemicals, in computational design and infrastructures originating from many different geographical and spatial locations, the more-than-digital Allah ring is drawn into vast, deeper and more complex ecologies of an inter-galactic scale to the Earth’s strata and life itself (Cameron 2021, 134). Similarly, the real Allah ring never had one point of origin in the Islamic world, because it is made up of many different elements from fire, sand used in the making of soda-lime glass to Afghani silver. It is the outcome of multiple processes of crafting and composing

often rooted in human and other-than-human agencies and histories of deep time.

Given all this, the more-than-digital Allah ring originates in multiple geographical locations and arises out of many influences. This array of coordinates includes the authors of its software and the designers of its many different forms of hardware; the materials from which they are made; the global logistics and supply chains of materials and electronic waste in which it circulates and is embedded and their repurposing as scrap metals in an obsolescent afterlife to its unique domain addresses, text files, code and electrical signals, and from the highly mobile particles that comprise their energetic circuits of interoperability, user inputs and multifarious interpretations (Cameron 2019, 61). Identifying, sourcing and capturing the so-called essence of a digitisation is thus an impossible task because of the radical interconnectedness and interoperability of all these coordinates and processes, the addition of new inputs, functionalities and capabilities as it circulates across vast scales, all of which make it possible and active (Cameron 2019, 61-62).

Here the coordinates that comprise the more-than-digital Allah ring are not just networks of discrete things, digital code, graphical interfaces, file formats, computers and discursive, disciplinary perspectives. My notion of thingness is post-relational (Cameron 2018; Cameron 2019, 61), that is, it incorporates different types of relatedness and embodied vitalities generated by the interoperability of digitisations. Thingness operates as the conation of the agencies of human, more-than-human, more-than-machinic and non-human bodies, and the vitality of organic and inorganic elements and technologies (Cameron 2019, 61-62).

In this light, the more-than-digital Allah ring is made operable through the machine mediated by its own set of interactions and the processing of information; through user inputs and narratives; through algorithms; through energetic fields; through smart materials, chemical and material agencies; and through vast planetary computational systems (Cameron 2019, 65). The SHM image on the Internet of the Allah ring, therefore, becomes open to and takes part in the world as it circulates across planetary scales in which these processes come together at multiple points and on many devices simultaneously through which it is distributed: by Al Jazeera, Archaeology.com, CNN, Discovery Channel, Science News, Tech Times, *The Washington Post* or *The Independent*. Curating, as I will describe later, must take account of these dispersed points of emergence, how this process is achieved and by what entities.

The digitisation as thingness and its gatherings as temporal-social-material-political-technical compositions operate as a lively federation of entangled agents and multifarious temporalities, spatialities and intra-active entities and their affordances as emergent compositions constantly forming and reforming (Cameron 2019, 60).

Through thingness, it is difficult to categorise the more-than-digital Allah ring and its unique coordinates as either distinctly humanly conceptual or ideational, technological, biological or mineral, for example, because they are radically interoperable as a sprawling web of force fields, in which none has an independent existence, and therefore cannot be extracted into discrete things or objects (Cameron 2021, 138). The use of thingness progresses a renewed consideration of the coordinates hidden from view or rendered discursively invisible, such as computational cognition (Cameron 2019, 61-63).

The concept of thingness as it applies to the more-than-digital Allah ring most importantly acknowledges it as a programmable thing: capturing its multiple dispersed and non-identical character, extended provenance and multiple locational politics and at the same time its heterogeneous interdependent coordinates, multiple networked modalities, its emergence as multivalent compositions, its transmedial, non-linear character and its changing forms and combinations on multiple devices (Cameron 2019, 61-63). Digitisations, especially those on the Internet, lack any inherent framing and are so dispersed, non-identical and dynamic that they can no longer be thought of as a coherent object or a thing, even though they might appear that way on an interface (Cameron 2019, 63).

REFIGURING CURATORIAL AGENCY AS DYNAMIC, MORE-THAN-HUMAN, ECO-CURATING PROCESSES

Influenced by Alfred Gell's (1998) notion of art and agency as a system of action directed towards changing the world, the term curatorial agency arose as a concept to promote a critical rethinking of contemporary art curation in culture and society. No longer merely viewed as an author or presenter of pre-existing artistic concepts, the curator, according to Suzana Milevska (2013, 69), is viewed as an "active social agent who contributes to cross-referential understandings of art between different artistic, cultural, ethnic, class, gender groups for the betterment of society".

Furthermore, in regard to digital cultural heritage, curating is generally viewed as an act of human, and more recently human-machine, agency (Cameron 2021, 140). Tasks are directed to data capture, that is, processes that seek to add value to digital data by assigning administrative, descriptive, structural and technical archival metadata to them and storing them as software, hardware and bits. As a result, the curatorial interpretation of digital data conforms to the notion of the informational object and its social constructivist and representational frames of understanding.

As new types of ecological compositions, curating and curatorial agency (denoting acting in the world through selecting, organising and influencing) take on a different meaning (Cameron 2019, 64). Curating is no longer authorial in the conventional sense of a series of actions by humans or automated systems—it is also the result of the vitalities of more-than-human and other-than-human coordinates together emerging as forms of eco-systemic curating (Cameron 2019, 65-66; Cameron 2021, 140). Here the production of curatorial knowledge and the act of curatorial authorship by humans operate in collaboration with all manner of vital coordinates forming intermeshed alliances with them as a new type of curatorial eco-logic (Cameron 2021, 140).

In three recent publications and my recent monograph, *The Future of Digital Data, Heritage and Curation in a More-Than-Human World*, I refigure curation as dynamic, eco-curatorial agencies (Cameron 2018; Cameron 2019, 64-65; Cameron 2021, 139-140). Curating is enacted through diverse eco-curatorial agencies often achieved through indeterminate acts of immanent or interdependent processing in formation made actionable through the interrelatedness and interoperability between, and performed by, a wider range of its coordinates (Cameron 2021, 140): that is, from software, programming languages, mathematical equations, machine learning and automated processes embedded in algorithms and bots to networks, infrastructures and calculative storage processes, to elemental chemicals embedded in computational capacities; from bitstreams and data to data centres, to planetary computational infrastructures and the electromagnetic forms of transmission that pass through data centres, and to the rare-earth minerals that serve as conductors of electricity (Cameron 2019, 65; Cameron 2021, 140-141). All these things produce their own eco-curatorial aggregations, different patterns of material, form and performative affects. Their generative capacities also constitute extended spatial-temporal structures and material durational processes of self-assembly (Cameron 2021, 141).

Together, all these eco-systemic processes contribute to the formation of an ecological composition's concrescence (the visual rendering of the Allah ring as a composition on the interface as opposed to a vision of concreteness as an emerging solid form) or act as an entry point to enact certain roles and actions (Cameron 2021, 141).

The extensive, broadened range of coordinates made possible through new computational design, through data processing to algorithms, to infrastructural expansion, for example, has distributed curating on a much larger and more expansive scale than we have ever seen before (Cameron 2021, 142). In contrast to the metal and mineral composition, mobility and physical distribution of the analogue, the digitisation is made and remade and distributed in a way mobilised by the eco-curating of metals and minerals, in which the analogue and the digital converge as elements embedded in deep ecological time. Such ecological webs and curating processes gesture to and make possible the extended reach and influencing capabilities of human actors across vast scales (as illustrated by the analysis of Donald Trump's tweets in my monograph), their distribution, the more-than-human domains of influencing (Cameron 2021) and, similarly, the more-than-digital Allah ring.

Curatorial agency is actionable by the interrelatedness between and performed by a wider range of actants from algorithms to bots to data centres, automated systems, human and machine subjectivities, code and the rare-earth minerals conducting electricity (Cameron 2019, 64-65; Cameron 2021, 140). Since non-human curating is a feature of such compositions, a different relational sense-culture emerges not just through technical or machine learning, but also through the curating activities of all its coordinates.

Further, curating as forming ecological alliances occurs simultaneously across multiple locations and scales—it is never completed or fixed; rather, it is vast, infinite, uneven and chaotic (Cameron 2021, 154). Within these ecologies, human curatorial agency and its subjectivities are subverted and made mutable and rhizomic through becoming curatorial ecological alliances emerging as multiple subjectivities with unpredictable, surprising or alarming effects (Cameron 2019, 63).

Curatorial agency and the production of knowledge, therefore, comprise multiple subjectivities as the affordances borne out the federation of actants operating within these extended, ecological, emergent compositions. Clearly, many actants, including non-human (what I call coordinates), are curating agencies if we view curation in the broadest sense as

acting in the world and at the same time looking beyond our limited view of online curation as acts by human curators and more recently algorithmic and machinic processes (Cameron 2019, 64-66).

So here we can no longer track curatorial authorship solely as a human act back to an origin or location as with conventional curating; rather, it is iterative, chaotic, distributed and extended (Cameron 2019, 64).

New eco-curating agencies are constantly enrolled in the emerging and mutating more-than-digital Allah ring ecological composition as it moves, extends and composes itself. The addition of new user inputs and algorithmic processing, the expansion of infrastructures through the laying of cables, the development of platforms, the enlargement of cloud storage, the ecological composition's appearance on multiple interfaces, devices and screens, and the ever-multiplying practices of copying and distribution by all manner of agents, all involve thousands of different eco-curatorial processes and temporalities (Cameron 2021, 220).

As ecological compositions, digital cultural heritage also self-curates in multifarious ways. These self-curating processes occur, for example, through the behavioural capacities of machine learning and calculations made possible by the biophysical properties of its coordinates, as well as through the contingency of environmental factors and through curatorial and user interactions in which they are enmeshed across and through its extended composition (Cameron 2021, 142).

Curating in an ecological sense can never be fully determined, due to the nature of its complexity, its inconsistencies in interactions and the indeterminacy of its calculations made through machine learning. Eco-curatorial actions never perform the same set of interactions and are therefore never identical and cannot be replicated (Cameron 2019, 64-66).

The making of the Allah ring's digitisation and its emergence as an ecological composition comprise a mesh of human, more-than-human and other-than-human acts of eco-systemic curating (Cameron 2021, 146). Its emergence involves human acts of composing particular fields of interrelatedness, including the capturing strategy and scanning technology involved, decisions about lighting, colour, size, scale, the texture of its surface, the illumination of its violet soda glass inset and script, the post-production composition and the choice of software for viewing and editing (Cameron 2021, 146).

Akin to techniques of pastiche, these acts of eco-curation are mediated by all manner of coordinates (Cameron 2021, 146). These processes include digital cameras, the location of their making through the scanning

equipment involved and through measurements, mathematical equations, laser beams, patterns of light, particles, electromagnetic waves, sensors, the data sets used for 3D images and pixels, and the analogue as its prototype. It is these inputs, alongside the creator's visual and conceptual engagement with the process, that bring its interfacial image into a visual approximation with its analogue to replicate the informational, aesthetic and political effects of its source (Cameron 2021, 146).

The more-than-digital Allah ring in active process and its emergence as an interfacial image are curated by its coordinates through their interoperability; they comprise a series of tight interdependencies, aggregations and sequences, each with their own variable temporalities, duration and presence (Cameron 2019, 64-65). Some coordinates and eco-curating processes, such as technical components, are more critical to its process of composing than others. The thingness aggregations and eco-curation processes that enable the more-than-digital Allah ring to be made operable include particles and fields, the mediation of silicon and metal, circuit boards, operating systems, binary code and signals generated by the values of voltage and the operation of logic gates (Cameron 2019, 64-65). At the level of programming, they are text files, algorithms, electromagnetic fields, media elements, bitstreams, images, shapes and behaviours represented as collections of discrete samples (pixels, polygons, voxels, characters and scripts) composed into larger-scale compositions through database logics and transactional metadata interactions, computer graphical user interfaces and platforms, and automation dynamically generated by user-defined queries, pre-programmed interactions and software agents (Cameron 2019, 60-61). Their reach, effects and complexity are scaled up when launched on the Internet. For example, interactions with digital devices and computational processes that enable the more-than-digital Allah ring to appear also comprise the interoperability of calculable and predictive entities, such as sensors, robots, algorithmic automations, Internet domains, cables, data centres, server farms and electronic circuits, and between the storable data and rare-earth minerals that conduct electronic devices, such as computers and smartphones (Cameron 2019, 60). Their state of concrescence as readable through the interface by human and machine alike, alongside heritage categorisations, cultural perspectives and emotive responses, is also powerful coordinates central to their emergence (Cameron 2019, 60-61).

The more-than-digital Allah ring in its composing mode is enabled by the flows of materials, minerals, chemicals embedded in computational

design, electromagnetic fields and information mediated through infrastructures, such as cables and data centres. Therefore, the ring, like other forms of digital cultural heritage, is part ideological, part textual, part technological, part narrative, part thought, part flesh, part mineral, part chemical, part computer code, part cultural interpretation, part geographical, part elemental process, part infrastructure, part archaeological and part heritage (Cameron 2021, 147).

For example, these processes become entangled with the subjectivities of the “real” ring and its significance as bridge between the Viking and Muslim worlds, as cultural symbol, as marker of identity and origin, and in debates over its historical interpretation. Here the more-than-digital Allah ring illustrates the non-linear experience of human thought, memory and history as a jostling of enunciations (Cameron 2019, 58): for example, from how the Viking and Islamic worlds became intertwined, or from theories of how the ring arrived in Sweden, from speculative accounts of the ring as war spoils, as a gift, as indicative of the buried woman’s conversion to Islam further suggested by her body being buried rather than cremated and her interment in traditional Viking attire (Nizamoglu and Yassir-Deane 2016). The more-than-digital Allah ring and its distribution made manifest struggles over the interpretation of the Muslim world both in medieval times and in contemporary political debates in Sweden over the Syrian refugee crisis. The ring’s analysis and its refiguration in connection with these events as contemporaneous were a convergence of its technical analysis and the publication of the findings on 23 February 2015 in the open-access journal *Scanning*. Although discovered in the late nineteenth century, the analysis of the ring’s material composition and design confirmed its inscription as Arabic Kufic and therefore its connection with the Caliphate. For Muslim historians, the ring and its digitisation were tasked to challenge historical amnesia in regard to the deep and ongoing connections between these two cultures evident through Arabic scripts and material culture, in fostering understandings of these complex, deeply entwined histories, and as an object that could promote cultural understanding and intercultural respect in the evolving refugee crisis in which such interactions and inhabitations had a historical precedent (Nizamoglu and Yassir-Deane 2016). All these are coordinates unique to each more-than-digital Allah ring acting as a dynamic composition in itself in which subjectivities and the cultural, political and aesthetic cues and fears and concerns that drive them are at times

indistinguishable from those gathering around their parent. The ecuratorial distribution and dispersal of sources and research noted in the 2015 paper interpenetrated the Muslim world and brought diverse perspectives together with those of Swedish archaeologists, citizens and politicians.

Here the more-than-digital Allah ring accrues a post-object status as multiple ecological compositions of thingness (Cameron 2019, 60-61; Cameron 2021, 148). This digitisation is therefore no longer solely sociological, nor does it share a common technical constitution. Each time the more-than-digital ring emerges in its form-like concrecence, it reproduces itself as unique patterns of resemblance and variation. The more-than-digital ring appears in different locations and on different devices through different routing, hardware, software and infrastructures, traveling across and through other coordinates mediated by cables, data centres, particles and energetic impulses (Cameron 2021, 147). When it is active rather than at rest, the ring operates as continuous processes of interoperability that may never be completed or circumscribed beforehand (Cameron 2021, 147). The journeying of the ring becomes planetary in its extensiveness.

In examining artefacts, structures and all manner of materials found in the field, archaeologist Ian Hodder (2012, 5) argues that biologies, technologies, societies, cultures, psychologies and cognition all flow “from the past, often the deep past”. With respect to digital cultural heritage as ecological compositions, its coordinates, humanness and human agency, the technologies we use, the societies and cultures that we inhabit, our psychological dispositions and cognitive processes alongside the non-human material, chemicals, energetic fields embedded in computational design—all emerge from multifarious pasts and deep geological times (Cameron 2021, 149). All of the digital and analogue Allah ring coordinates, those they share and also their own, embody memory traces like genetic instructions, human and non-human histories embedded into its DNA that replicates and changes, and they all operate together through multiple, non-linear, enfolding and unfolding temporalities.

The shared memory traces embedded in the analogue and the more-than-digital Allah ring include the native silver found in the Earth’s crust in its pure, free elemental form as an alloy with gold and other metals and minerals such as argentite and chlorargyrite; the invention of metallurgy, material processing and silversmithing in prehistory; the discovery of their geological affordances; the development of mining technology and the

mining and processing of minerals such as copper long buried and emerging in geological time. Other convergent histories in the making of the more-than-digital Allah ring include the invention of computers, the culturing of light for creating images, cameras and the writing of digital code, emerging digital infrastructures, algorithmic systems and so forth. Here the histories of the more-than-digital Allah ring extend and unfold in multiple forms, temporalities and processes.

As ecological compositions, the digital and the parent represent a mixture of coordinates that are not only historically and spatially distant and prior but also future oriented in their emergence (Cameron 2021, 149). For example, their respective meshes of thingness extend into the future as forms of material evidence of past and emerging relations and enjoined cultural histories between (Viking) Sweden and the Muslim world. That is, from debates in regard to Syrian refugees and an intent to dispel commonly held negative attitudes and perceptions about them, the role of Islam in building other cultures, critiques of the Western writing of history, the promotion of a shared global cultural heritage and intercultural respect through these convergent histories (Nizamoglu and Yassir-Deane 2016). The making of the more-than-digital Allah ring and its circulation, rather than being viewed as a digital capacity located in human thought, action and semiotics, power becomes distributed across the ecological composition's heterogeneous field as dense eco-systemic and curating processes of interrelatedness and interoperability in which these subjectivities are embedded (Cameron 2019, 60). Strikingly, digitisations as thingness comprise the interoperability of their immediate technicities and locales, but their coordinates are extended through their addressability across multiple, multivalent layers in planetary computational infrastructures (Cameron 2021, 140).

Importantly, digitisations have both a human and a deep-learning aesthetic (Cameron 2019, 61-62). The ring as operational image inflects a human aesthetic—an appreciation of the beauty of its crafting, the awe invoked by its connections between the Viking and Islamic worlds through its Kufic inscription, and the vibrancy of its violet inset glass previously believed to be amethyst. Accordingly, digitisations are judged on the basis of and to the degree to which they resemble the human aesthetic of their real parent (Cameron 2007). On the other hand, the more-than-digital Allah ring reflects the operations behind it as its own automated aesthetics, a result of its machine capacities comprising a deep network of neural layers (Cameron 2019, 62). Here an aesthetic emerges of what data does—a

neural aesthetics of computational processes that is not human. They appear as images but emerge as a result of processes that are deeply entwined within their neural, machinic ecologies (Krizhevsky et al. 2012; Cameron 2019, 62). Here the image as automation has an inherent ability to exert forces on itself and humans alike, as illustrated by discussions on the meaning and significance of the Allah finger ring (Cameron 2019, 63). Code, for example, is not a simple and pre-determined set of logical instructions as might appear on a computer screen; rather, it is performative and continually produced within computational processes, as what media theorist Luciana Parisi calls an operative mode of thinking (Parisi 2011; Cameron 2021, 63).

THE MORE-THAN-DIGITAL ALLAH RING AS TECHNOSPHERIC HERITAGE

Digitisations are also complicit in what Peter Haff calls the Technosphere. The Technosphere is a subsystem of the Anthropocene brought about by the evolution of technics in which large-scale technology becomes a question of the geology on which humans depend (Haff 2012, 149-156; Haff 2013, 395; Cameron 2019, 62). Digitisations and digital heritagisation more generally operate as part of what Eric Hörl (2016, 2017) calls a new sense-culture comprising a machinic and relational constitution of sense operating within complex socio-technical ecologies and complicit in technological semi-autonomous systems that lead to environmental exhaustion (Cameron 2019, 62). Their complicity in the Technosphere is through the mining of rare-earth minerals, the use of non-renewable energy to drive the digital economy and the vast amounts of data that are produced, stored and unsustainable in the long run (Cameron 2019, 62-63).

When imagined as an ecological composition, the more-than-digital Allah ring will appear a technological fossil in the archaeological record (Cameron 2019, 62). These fossil traces are most likely to be the hard parts of digital technologies: the data centre buildings; the rare-earth minerals that comprise them; the metal, the wires, the plastic and so forth (Cameron 2019, 62). This is a different type of fossil than the ring recovered from the archaeological record, with both subject to decomposition in which they share minerals and metal traces.

The conceptualisation of the more-than-digital Allah ring as a series of non-identical, sprawling, unruly ecologies and its curation as ecological processes of radical interoperability made actionable by the multifarious

affordances of its thingness (Cameron 2019, 62-63) can be illustrated through a series of surprising events. The Internet operates as multiple meta-territorial domains of infinite reach and depth populated by diverse actants of the human, more-than-human and non-human kind mobilising all manner of social, economic and political possibilities, frictions and resistances (Cameron 2021, 47).

Digitisations on the Internet are subject to a series of uneven and chaotic interactions of the type that Benjamin Bratton (2015, 69) terms “machinic jurisdictions”. Through their rhizomic lines of flight, these disrupt and transcend supposedly ordered local, national and global geographies (Cameron 2021, 152).

One example of a cosmopolitical line of flight in which the more-than-digital Allah ring is implicated is its role as a signifier of Muslim cultural identity in which it was mobilised to counter negative representations of the Islamic world. To this end, the interfacial images of the more-than-digital ring operated through their machinic eco-circulation as indisputable facts of Muslim sophistication and prowess and at the same time became matters of concern for contemporary relations with Syrian refugees. These machinic, more-than-human and other-than-human infrastructures brought these concerns and stakeholders together (Cameron 2008).

The digitisation’s politics is not only the human, but also the more-than-human and other-than-human (Cameron 2019, 63). The political capacities of digitisations occur at the very moment they are made machine and human readable appearing as visible “objects” and therefore able to accrue power. Here, more-than-data ecologies were used to articulate political questions such as Muslim identity and place in history. The conditions of possibility that enabled Muslim historians to become involved in the debates over the Allah ring and to make cultural claims were borne out through the agential relatedness promulgated by computational infrastructures; language and programming; and code, algorithms, non-human agencies and the people involved, such as software designers.

Data politics is not only of the more-than-human kind; it is also borne out by what media theorist Luciana Parisi (2011) calls “soft thought”. The subjectivities of soft thought involve not simply the execution of instructions, explains Parisi (2011, 10), “but develop its own algorithmic modalities where the sequence of instructions changes according to the way the machine orders data” (Cameron 2021). Here we see the techno-extension of cognition into the world (Parisi 2011, 10), based on machine learning and emerging as strikingly new coordinates in digitisation

ecologies (Cameron 2019, 63). Novel forms of digital communication and machinic automated thoughts and memory emerge out of the quantification of data from which new capacities for power and manipulation arise. Machine logic also signals the end of the notion of reasoning and truth (Majaca and Parisi 2016) that we so value in the heritage work based on human cognition. Instead, new forms of computational thinking and subjectivities emerge around and within more-than-digital compositions (Cameron 2019, 63-64).

Critically, thingness as a concept in which machine learning is now a coordinate opens a space to consider the more-than-digital Allah ring akin to what Deleuze and Guattari (1987) call “bodies without organs”, that is, a composition or a plane of consistency that concretely ties together heterogeneous coordinates with no underlying organisational principles or “bodily” structure that can be known in advance (Cameron 2019, 63). Here the Deleuzian notion of “body without organs” also best describes how digitisations as thingness are curated in these dense ecologies (Cameron 2019, 62-63).

In these circumstances and contexts, human users as participants in interactions with the Allah ring digitisation and its subjectivities operate as becoming more-than-human and other-than-human intersubjective alliances with switches, robots, codes, algorithms, sensors and organic and non-organic things (Cameron 2019, 64-65). The notion of the museum user as an autonomous agent is therefore technically defunct (Cameron 2019, 65). When users operate within these ecological alliances, they become part of the thingness of the more-than-digital Allah ring (Cameron 2019, 64-65).

CONCLUDING REMARKS

While digitisations can be explored through multiple optics, here I choose to move from a normative semiotic and representational reading of the digitisation grounded in a humanist informational and computational paradigm to embrace a broader range of coordinates that represent their expanded, ecological and machinic involvement in the world. A digitisation is no longer solely a visual symbol or digital object; rather, it is part and parcel of a sprawling, machinic ecology of human, more-than-human and other-than-human actors, historical events, entanglements and emergent possibilities (Cameron 2019, 66). All digitisations acquire thingness and as things-in-themselves, they are non-identical; having their own

history, each is technically and processually unique, embodying a different type of computational aesthetic and individuated human and machine politics (Cameron 2019, 65).

Within this new, extended ecologic, digitisations are therefore no longer solely informational, nationally situated, geographically located, human centred or apolitical; rather, in crossing multiple national territories, they are subject to machinic jurisdictions within global computational infrastructures, due to the automations of search engines and social media sites (Cameron 2019, 65).

Viewing digitisations through an ecological optic enables us to widen the circle of what we consider human, to rethink subjective and human positions in digital cultural heritage practices and to frame new collectives that encompass a wider range of more-than-human, machinic and other-than-human things (Cameron 2019, 65). Critically, the locational politics of the human—the user, curator and collections manager—is decentred and even displaced in these more-than-digital and other-than-digital ecologies (Cameron 2019, 64-65). Here the thingness we call digital heritage is codesigned by its coordinates and their conative agencies.

On a final note, digitisation as a descriptor identifying itself as a copy alongside its charge as a terror suspect is no longer tenable. It has never been identical to its parent, nor to itself. It never was a copy and never will be a copy, nor is it solely digital based on material descriptors. It is a novelty, constantly changing, remaking and curating itself (Cameron 2019, 65).

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