

Artefact or art? Perceiving objects via object-viewing, object-handling, and virtual reality

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Abstract

In the past two decades museums have sought increasingly to engage audiences with their collections through digital media (ARNOLD-DE SIMINE 2013a), yet there is little empirical data on how the digital experience itself affects visitor perceptions of objects. To address this issue, the Museum of the University of St Andrews (MUSA) and the School of Classics conducted a series of experiments comparing visitor responses to archaeological material presented in four different formats:

- 1) 3D digitisations*
- 2) A display case*
- 3) A sensory box*
- 4) Artefact handling*

This article discusses key findings in relation to visitor interest, enjoyment and understanding, and analyses whether objects are more likely to be perceived as 'art' or 'artefact' in different contexts. Finally, it outlines implications for museum policy on the use of digital media and exhibition design.

Introduction

Over the course of their development, European museums have performed a variety of functions in society, but since the 1980s, particularly with the emergence of *The New Museology* (VERGO 1989), attention has shifted towards issues such as the museum's relationship with its community, equality of access and the visitor experience. There has also been considerable discussion on the process of 'meaning-making' in museums, i.e., the power of objects to "accumulate meanings as time passes" (PEARCE 1994, 19). This process occurs through changes to the use, ownership or context of an object before and after it enters the museum, and through the reactions of visitors to a display. For museums with archaeological collections, 'meaning-making' is complicated by the fact that many artefacts were originally collected and displayed as art, divorced from their archaeological context. This poses a number of challenges for museums today; without an understanding of an object as artefact or of its entangled past, it is difficult for visitors to understand its significance for the societies that made and used it. Artefacts selected for display may appear to be superior or more valuable than others in storage, and trade in illicit antiquities may be inadvertently encouraged if artefacts are perceived as being separate from the societies that created them.

Exhibition design clearly affects how an object is perceived, particularly in terms of art or artefact, however, museums also need to address the question of how different sensory experiences influence visitor impressions of material culture (EDWARDS et al. 2006, 2).

To this end we undertook empirical analysis of a number of different user groups to see how their perceptions of archaeological material changed depending on how they experienced it, whether viewed inside a glass case, explored through touch (with and without sight), or in a digital format. Although we recorded the wide range of interpretations of our user groups, we focused on the commonly used distinction of art/artefact and aesthetical/functional.

Fundamental to these tests was the inclusion of digital representations of the objects. In recent years, digital technologies have been used to help make museum collections more accessible to the public, as surrogates for real objects that cannot easily be displayed, and as supplementary resources to deepen visitors' understanding. Stogner (2009, 392) suggests digital media can boost visitor figures and broaden audiences, in particular attracting younger digital natives. Although there is an assumption that provision of digital media is positive, more comprehensive studies are needed to understand varying levels of uptake between different user groups according to factors such as age, experience and interests (FALK 2009)¹. There remain critical questions regarding the use of digital media, such as: What impact does it have on perceptions of material culture? Does it affect levels of understanding and retention of information? Does it appeal to all? This article sets out to answer these questions drawing upon evidence from our audience research at MUSA. Furthermore, our user-analysis has allowed us to develop a number of pertinent points concerning perceptions of material culture in museums, particularly as art or artefact. It has also enabled us to evaluate the effectiveness of digital media in assisting visitors to understand the entangled history of an object, thus leading to better contextualization of the material. As such, our work provides a timely contribution to wider studies of digital engagement within the museum and heritage sector.

Perceptions of Material Culture

People relate to material culture on a range of different levels, including personal and public, and see a variety of meanings in it, including symbolic, aesthetic and functional. Alberti (2005, 568) also notes that the diversity of meaning is increased by the choices curators make about which objects to display and how to present them, especially in relation to one another. There is a tension, however, in the fact that the curator will often arrange material based on prior experience and knowledge that the viewer may not necessarily share. Diverse approaches are taken to studies of material culture depending on discipline: archaeology, art history, anthropology, history and sociology. A multitude of different approaches and interpretations are valid; as art, archaeological material can be seen as a vehicle to educate, elevate and entertain, and as artefact, as allowing access to the people, the social order and the contexts behind them.

¹ The importance of the visitor as an individual underlies Falk's call for a more enhanced museum experience. The Tate have analysed online activity on their own sites (Appendix 5, Let's Get Real Report, 2011). However it does not segment the results by visitor traits.

The idea that there are differences between art and artefact is partly a consequence of institutional history. As Whitehead (2009) argues, museums themselves have contributed to the separation of material culture into the distinct disciplines of art history and archaeology. The fact that the British Museum collects ancient Egyptian, Greek and Roman art while the National Gallery acquires European art from the 1300s onwards does not result from any inherent difference between the material that makes the former more 'archaeological' and the latter more 'artistic'. Rather, the division results from the historical actions of these institutions as they competed for power, territory, recognition and resources (WHITEHEAD 2009, 8).

The now considered flawed notion that art and artefact are separate entities impacted heavily on earlier approaches to material culture. For example, red and black figure pottery was seen as high quality art, leading to issues of connoisseurship² and a side-lining of other material culture as well as original context. Often, material culture without context was seen as art. Cycladic figurines are a typical example of this (CHIPPENDALE & GILL 1993). They have been looted and traded so often that few have been found in their original contexts, impacting on our current understanding of their function (BRODIE & RENFREW 2005). Emphasising material culture as artefact helps to maintain a connection with its original archaeological context and in turn should contribute to a wider understanding of the issues of illicit antiquities (BRODIE et al. eds., 2006).

Critical to this is the individual, often subconscious, judgement made on whether the object has aesthetic value or not and whether this changes depending on levels of contact and experience with the object. The idea of beauty is neither fixed in time nor location as tastes change. The sense of being able to define good or bad art often lies at the heart of such judgements³. For example, the founding principles of the Victoria and Albert Museum were to improve industry design standards by educating the public about art and design. Under the directorship of Henry Cole in the 1850s, the Museum of Manufactures, as it was known then, included not only the best, most inspiring examples of metalwork, ceramics, glass, and furniture, but also a 'Gallery of False Principles'. Here, curators displayed and critiqued examples of poor design work, and juxtaposed them with alternative objects "judged successful and correct" (Victoria & Albert Museum, 2016). Challenging this idea of fixed aesthetic value is the Museum of Bad Art (MOBA) founded in Boston in 1994. With up to an average of 9000 visitors per year, enough interest in bad art has been generated simply by hanging it in the museum. The intention of the museum was to display bad art, but the museum and viewer have imbued value in it, even if it's not aesthetic value.

When it was newly opened in the mid-1980s, the Centre for African Art, New York City (now the Africa Centre), held an exhibition entitled ART/Artifact. The displays included items such as a hunting net and a 19th century brass sculpture of a head. There was a video of a religious sacrifice providing the context for the displayed commemoration posts. Object information labels were not provided in some spaces, while they were purposely provided in the room termed the 'art museum' (FARIS 1988). Faris (1988, 778) criticises the 'art museum' room as details of why certain objects were chosen for display as art were not explained, thereby emphasising a sense of an aesthetic driver that may not have been intended. The exhibition also showed that while aesthetic plays a role in interpretation, the importance of the museum context should not be underestimated. Art or artefact is clearly the viewer's interpretation/perception rather than the maker's intention. The distinction is created through context, means of display and viewer interpretation.

As Gell (1996) surmises, one of the issues with the work on defining art or artefact has come from the perspective of those working in art who have difficulties in seeing artefact as art. By any definition an artefact is worked or made with intentions for use. They may be culturally specific and in all cases they reflect human agency. It is arguable thus that art is artefact. However, art can be defined as such by its placement in a gallery space. So if an artist installs a 'found object' such as a rock in a gallery, the choice to display the object still reflects intentionality that can make it art. Additionally, placing the natural object in a gallery will further enhance its perception as art because of an implied relationship to more recognisable works of art.

2 For example, see the Beasley Archive: <https://www.beasley.ox.ac.uk/tools/pottery/default1.htm>. Beasley's methods of stylistic analysis and identification of artists is still controversial with those who still use his methods (Oakley 1998) and those who have been highly critical (Whitley 1997).

3 Other dichotomies such as this may include primitive/sophisticated and natural/artificial.

The same may be true of archaeological material on display in a museum or art gallery. Although the original intention of the creator may have been for it to be a functional piece, its complex history changes it to becoming an object of value, a stolen item (in some cases), a collector's piece, to an object (art) on display. As such, its intended character is not always the same as its actual character as it moves from archaeological to museum context (PEARCE 1994). These are entangled objects: "Objects are not what they are made to be but what they have become" (THOMAS 1991, 4).

To enable visitors to gain a deeper understanding of the material culture museums must examine the object's entangled history, that is to say the complex history of how it got from its original context to the museum (CLASSEN & HOWES 2006, 209). There are innumerable interdependencies between objects and people; put simply, objects depend on people and on other objects, just as people depend on objects and on other people (HODDER 2011, 154). From this perspective, all aspects of an object's life are significant and are crucial features in the development of an understanding of the object itself.

The provision of a detailed discussion of an object's entangled life in the museum setting can empower the visitor to begin to re-contextualise the object in their own mind. It could be argued that 're-contextualisation' is not the most accurate term for this process, as rather than returning an object to a previous context, the discussion of its entangled life is creating a new context for the object which is both current and chronologically broad. Elsewhere, this process has been described as 'meaning-making' (BLACK 2012, 145; 149) on the part of the viewer, which implies both the agency of the museum visitor to draw their own conclusions, and the multiplicity of possible interpretations of the object (FALK & DIERKING, 1992). In this sense, offering details of an object's entangled life challenges the traditional historical narratives and paradigms often propagated by museums by allowing the visitor to take an active, rather than passive, role in their own understanding of each object.

Looking at the entangled lives of objects can further enhance visitors' understanding by creating the opportunity for comparisons to be drawn with the visitor's own everyday life and experience. For example, a ceramic fragment on display behind a pane of glass in a museum might not resonate much with a visitor, even if the label lists its find spot, period and material. However, including details of its entangled life – including possible function, acquisition history and relation to other objects – may help the visitor to form a more rounded idea of what the object is. In her work on visual culture in museum settings, Vallance (2008) suggests that visitors interpret all imagery as part of a cyclical continuum, wherein everyday objects as mundane as supermarket advertisements occupy a position on a spectrum shared by what might be termed 'fine art' and by typically museum-standard objects. This model produces two important results: firstly, that visitors are capable of drawing meaningful comparisons between objects already familiar to them and objects they view in a museum setting, and secondly, that all objects exist on the same continuum, with no defined demarcation between objects 'worthy' of being in a museum and the rest. Instead, visitors have the agency to foster their own understanding, and to make use of their own experience as part of their museum visit.

While the idea that all museum objects are inherently divorced from their original context might be an irrevocable aspect of the very concept of the museum, it ought to be acknowledged that the inclusion of details of an object's entangled life can be a conscious attempt to place the object into a context which is current, transparent and informative. The additional use of digital media – particularly 3D reconstructions – allows visitors to interact with the object beyond simply viewing it from the other side of a pane of glass. This in turn empowers the visitor further to step outside their traditional role as passive recipient of information, and instead become an agent in the process of understanding. All visitors have a personal agenda for their visit, influenced by their own knowledge, experience and attitudes (FALK & DIERKING 1992, 25). Additionally, Falk's (2009) model segments visitors into groups according to their motivation for visiting (e.g. 'Explorers', 'Facilitators', 'Experience Seekers', 'Professionals/Hobbyists', 'Rechargers'). This, he believes, is the key to museums competing with other leisure activities and providing the kind of tailored service consumers expect. Interpretation must likewise be tailored to different audience requirements, interests and varied learning styles. Falk (2009) has gone on to develop this to advocate a museum visitor experience model where he believes a visitor's experience should be fulfilled by a museum coming in line with their expectations of it. Furthermore, Di Pietro et al. (2014) have argued that in order for a museum to sustain itself it needs to tailor its strategies to visitors' varying cultural backgrounds.

Museums often try to take a neutral stance on controversial subjects; many museums seek to represent multiple views and involve their audience by inviting people outside the organisation to write labels or by recording soundbites from visitors to play alongside the object. Digital media works in a similar way: on one level it encourages a fluid interpretation and multiple voices; on another, there is a tension between encouraging flexibility while also ensuring a certain authenticity. This, however, has to be balanced with a museum's duty to provide access to ordered collections for research and knowledge transfer (PUTNAM 2009, 7). As Malvern notes, War Museums tend to be sidelined in these wider debates. Each time a museum undertakes refurbishment and development; there is a renewed analysis of visitor interpretation of the meaning of objects on display. For example, when the Imperial War museum was originally established it was with the intention of holding records of World War I (MALVERN 2000, 178). It has since become a popular museum with some 2.4 million visitors per year. However, its mission statement⁴ includes desires to be authoritative yet empathetic to visitors through the stories of the, often uncomfortable, objects; a difficult balance to strike given the need to prioritise visitors and allow manifold interpretations. However, as Malvern (2000, 179) notes, knowledge of the museum's own history is as relevant to a broad interpretation as the entangled life of an individual object displayed. In this case, the fact that the museum was established with the belief that they would only house records a single world war but has since incorporated material from every war the United Kingdom has been involved in, means that there has been a significant change in the museum's purpose.

Museums and Digital Technology

In the past two decades museums have shown increasing interest in making parts of their collections available for viewing through digital media (DIN & HECHT 2008b, 9-11) (ARNOLD-DE SIMINE 2013b, 188). Making collections accessible to the public is a fundamental remit of modern museums, and digitisation offers solutions to many of the practical challenges associated with collections care and access. The use of digital media to attract visitors and make collections accessible to a wider public is undertaken in a variety of forms⁵. This ranges from straightforward 2D images of material on websites (Getty's open content programme)⁶, to more elaborate downloadable 3D images and integrated archives for education (Petrie Museum, London)⁷, to the creation of 3D models for sale in the museum shop (Fitzwilliam Museum, Cambridge)⁸ or using 3D models as records for conservation purposes (Virginia Commonwealth University)⁹. Many museums have embraced the use of digital media in galleries to enrich their displays. In 2015, the British Museum created a virtual reality Bronze Age round house and offered visitors 3D headsets and tablets to explore it. This is especially effective for showing non-specialists how features of an archaeological site, such as post holes and stake holes, relate to the original dwelling (CARROZZINO & BERGAMASCO 2010)¹⁰. Additionally, creation and provision of digital content on-line means that visits need not be restricted by opening hours, admission charges or physical location; museums can provide virtual representations of objects which would be too fragile or difficult to display. Museums can now market their collections to a global audience and increasingly, break down traditional hierarchies between curators as 'producers' of culture and visitors as 'consumers', with so-called 'digital volunteers' enlisted to improve institutional knowledge of collections (Department for Culture, Media and Sport, 2016).

4 https://www.iwm.org.uk/sites/default/files/documents/iwm_ara_16_17_web.pdf

5 <http://www.museumassociation.org/museum-practice/3d-technology/15082013-the-potential-of-3d-technology> (accessed 26 August 2016).

6 <http://www.getty.edu/art/collection/> (accessed 24 August 2016).

7 <http://www.museumassociation.org/museum-practice/3d-technology/15082013-petrie-museum> (accessed 24 August 2016).

8 <http://www.museumassociation.org/museum-practice/3d-technology/15082013-fitzwilliam-museum> (accessed 24 August 2016).

9 <http://www.museumassociation.org/museum-practice/3d-technology/15082013-virginia-commonwealth-university> (accessed 24 August 2016).

10 https://www.britishmuseum.org/about_us/news_and_press/press_releases/2015/virtual_reality_weekend.aspx. (accessed 20 September 2016).

There is a balance to be struck in use of technology. We know from previous work and this study that it is not always universally appealing. People have a range of interpretations of the material depending on their own age/experience and how the material is presented (BRUNO et al. 2010). For example, in her MLitt project at the University of St Andrews in 2015, Catherine Cruickshank ran archaeology workshops with three different age groups (children aged 7-12, teenagers and adults respectively) incorporating use of a 3D scanner and digital images¹¹. This was an experimental project in which ten objects were chosen, scanned and uploaded to WebGL by the Open Virtual Worlds team for viewing on her website¹². All groups showed enthusiasm and interest in the use of new technology, but this was most pronounced among teenagers (seventeen out of eighteen enjoyed the 3D reconstructions, compared to six out of nine children). Amongst the adult group, all nine participants enjoyed both the digital and handling aspects of the workshop but five preferred seeing the real artefacts and only one preferred the 3D images, with the other four unsure.

It has been argued that the presence of digital media can distract too much from the actual material culture in museums (PARRY 2007). This question has been addressed in a recent study undertaken by the Association of Science Technology Centres who asked museum leaders two questions about the use of technology: whether there was ever too much and whether it engaged or distracted. In all cases, they noted that acknowledging the potential for distraction allowed a better balance to be struck in the use of technology, and that the original objects should remain at the forefront of user engagement (SCHUSTER 2014). Furthermore, there is a danger that digital technology might augment a notional divide between art and artefact. This was observed by Latimer (2011) who noted that despite a consistent approach to interpretation and use of digital media across the recently re-developed Kelvingrove museum, the particularly strong criticism of the new art galleries betrayed a continued assumption that art should be treated differently, even more reverentially than other types of collections.

Despite the current enthusiasm for digitisation, Parry (2009, 2) notes that it is still difficult to find a central source of policy, advice and resources on digital heritage across the globe. The Report from the Culture24 Action Research Project 'Let's Get Real' (2012, 4) found that "organisations regularly invest in cultural websites, social media activities and online services without a clear idea of what the services are trying to achieve, or their intended audience". Nor is there an agreed method to measure success in terms of "user behaviour, engagement and satisfaction" (ibid.). As such, an important aim of our work was to contribute empirical research to assess levels of understanding and enjoyment of material culture when presented in digital form.

Bridges Collection

To assess the extent to which different sensory experiences impacted on interpretation and enjoyment of material culture we devised a series of experiments using a small collection of Cypriot material which was donated to the University of St. Andrews in 1994 by the Bridges family. The collection consists of 184 artefacts, mostly ceramics, ranging in date from the Bronze Age to the Byzantine period, including Hellenistic and Roman lamps, as well as Archaic and Classical figurines (figs. 1 & 2). The Byzantine material mostly consists of sgraffito bowls (fig. 3). There are also a few bronze and glass objects, including lamp stands and beads from various periods. The material was accumulated by the Bridges family during the 1960s, when Mr Bridges was employed by the British Council in Cyprus. Prior to the 1970 UNESCO Convention on Cultural Property,¹³ it was fairly common for individuals to build up private collections of antiquities, choosing pieces on aesthetic grounds, with little regard for their provenance or the destructive consequences of feeding the antiquities trade.

¹¹ <https://arts.st-andrews.ac.uk/bridges-collection/>

¹² <https://sketchfab.com/openvirtualworlds/models>

¹³ (<http://www.unesco.org/new/en/culture/themes/illicit-trafficking-of-cultural-property/1970-convention/>) (accessed 18 May 2016).



Fig. 1
Bridges collection
 Incised spindle whorl, Bronze Age
 HC1994.3(136)



Fig. 2
Bridges collection
 Oil lamps, spindle whorl and baby
 feeder, various dates
 HC1994.3 (1,6,7 & 137)

In 1994, following consultation with Professor Vassos Karageorghis (former Director of Antiquities and former Director of the Anastasios G. Leventis foundation in Cyprus), Mrs. Bridges offered the collection to the University of St. Andrews for teaching purposes. It is now displayed in the School of Classics, and although the University does not seek to expand the collection through new acquisitions, it is used extensively for hands-on teaching within the University, the wider community and schools. Items are also shown regularly in temporary exhibitions at the Museum of the University of St. Andrews (MUSA) and are used in public events such as MUSA's monthly Young Archaeologist workshops (fig. 4). One of the challenges of using this collection, however, is that the objects lack contextual information, divorcing them from their (pre)historical environment.



Fig. 3
Bridges collection
 Byzantine sgraffito bowl
 HC1994.3(15)



Fig. 4
Experiments: viewing the material
behind the glass case

Bridges Collection and Medium of Experiencing

To provide a range of sensory encounters based on current museum provisions, we provided four different means of interacting with the Bridges Collection (in a museum case, in a handling box, in digital reproductions and handling the real object) (fig. 4). This allowed us to analyse the success of each interactive method for different users in terms of interest, enjoyment and for conveying key information regarding provenance and function. Central to the analysis was whether the medium of experience affected visitor perceptions of the material itself. Recently, scholars such as Edwards, Gosden and Philips (2006) have researched the use of different senses in museums. Our analysis of the four different media of experiencing contributes further to this analysis.

An interactive exhibition was held at the Museum of the University of St. Andrews (MUSA) from 15 June 2016 to 20 April 2017. This was located in the Learning Loft, an educational space which is open to the public. It was the only object-based display in the room at the time. It featured a large glass display case containing 21 objects from the Bridges Collection, an illustrated text panel and labels, designed in accordance with MUSA's interpretation guidelines. A sensory box containing replicas was situated next to the case, alongside a bank of computers with 3D images and links to contextual information. During our focus group sessions artefacts were removed from the case so that participants could handle and examine them closely.

Sensory Box

To test the importance of touch we decided to use a sensory box to allow participants to feel a replica object without seeing it. We placed this box strategically beside the traditional museum case. A local potter, George Young, took on the task of recreating four objects: a lamp, a perfume bottle, a flask and a spindle whorl for the handling box (figs 1 & 2). By engaging a contemporary potter we also gained valuable insights into how the pots were made, used and decorated.

Digitisation and 3D Images

There were a number of practical reasons for digitising the collection; to make it more accessible to academics and the public; to provide material for archaeology and museum studies students to experiment with creating virtual exhibitions; and to reconnect the material to its archaeological contexts by linking information as well as websites and topographic data. The digitisation of the collection meant that it was possible to connect it to maps of Cyprus and archaeological contexts with details about type sites (such as burial, domestic, religious) based on comparisons with better provenanced Cypriot material.

To create the 3D images, objects were reconstructed using the Autodesk programme 123D Catch and then Agisoft Photoscan¹⁴. Once the 3D reconstructions were created on this site, they were then uploaded to The Bridges Collection pages on Sketchfab¹⁵. Sketchfab is a platform for hosting digital images and one favoured by museums such as the British Museum. The 3D images create an online archive available to staff and students for teaching and research. Additionally, the material will form part of the University of St Andrews virtual museum which is in development by Smart History and will be freely available on open access in due course.

¹⁴ <http://www.123dapp.com/> and <http://www.agisoft.com/>.

¹⁵ <https://sketchfab.com/bridges> (accessed 27th October 2017).

Audience Research Methods

Two primary sources of data were examined for our study of perceptions of material culture. First, a web-based survey located in MUSA, which visitors completed independently after exploring each part of the exhibition. This analysed differing perceptions of material culture according to the format in which it was experienced. Second, 9 focus groups were recruited to provide more in-depth qualitative data. These varied in size from a group of 4 to a group of 22, and included: a mixed faculty student group (Group 1), MUSA's Young Archaeologist club for 7-12 year olds (Group 2), St Andrews Town Archaeology Society (Group 3), a mix of students and the public (Groups 4 and 7), the University Archaeology Society (Group 5), Museum and Gallery Studies students (Group 6), Social Anthropology students (Group 8), and an out of school club for children aged 5-11 (Group 9).

The groups were selected in order to compare the responses of those with no archaeological experience and those with experience, as well as differing age groups. The age group divisions corresponded broadly to those used in MUSA's Learning and Access programme, i.e. school-aged children, students/young people and adults, in order to both inform future programming decisions and to consider the data in the context of wider generational differences in the use of digital media. Various methods of recruitment were employed, including direct contact to student societies and lecturers, adverts on posters and a callout on MUSA's mailing list. Participants were informed that they were taking part in a study by MUSA and the School of Classics and asked to explore the exhibition section by section. They also had the opportunity to handle original material from the display case.

We met with and gathered information from 9 groups (altogether 94 people) from April – October 2016¹⁶. The first focus group meeting was held in the Archaeology Room of the School of Classics, where minimal information about the material is provided. All subsequent focus group meetings were held at MUSA, using the newly designed interactive exhibition.

Initially it had been intended that participants would simply fill in a questionnaire, but as scholars have found in the past, we realised that far richer, nuanced data could be gathered via focus group discussions (NELSON & COHN 2015, and DODD et al. 2012)¹⁷. The method employed to gather data from focus groups was similar to a semi-structured interview. At each stage, a facilitator used a pre-determined set of open-ended questions, such as "How would you describe this type of material?", followed by more specific prompts to gauge whether the format of display and interpretation affected perceptions of the same set of objects. Prompts included: "What do you think this object was used for?", "Where do you think it might have been used?", "Why?" The questions were repeated with each of the four interpretative formats and each focus group. A note-taker recorded the participants' replies and any relevant observations on non-verbal behaviour, e.g. which activities lasted longer, how participants interacted with objects and how much discussion was generated. A consistent structure was also employed for the sessions, starting with the exploration of the display case, then the handling box, the digital reproductions and finally the hands-on experience with the original material. Allowing for the fact that visitors might build knowledge progressively through the process we reversed the order in which they explored the exhibition for the two final groups.

The notes were collated together following each session, then comments were grouped into similar themes by the researchers. In addition to our key categories of art/artefact, we recorded views on functionality, aesthetic, tactility, ease of understanding of material and enjoyment. A summary of our findings is presented in the Appendix.

16 Mixed Faculty UG Students (8); Children (Young Archaeologists) (12); Archaeology Society (mainly interested adults) (5); Fresher's week (general) (8); Archaeology Society (Students) (12); Museums and Galleries (Students) (10); Public/Student Group (6); Anthropology Students (22); Lawhead after school club (p1-p6) (11); Through a Glass Darkly Preview (38)

17 The Victoria and Albert Museum promote the use of qualitative analysis for '... attitudinal information. It is important in assessing the likely enthusiasm for projects. It identifies barriers and how to overcome them, generates new ideas, tests visual concepts, explores motivations, attitudes and lifestyle needs and compares different approaches' <http://www.vam.ac.uk/content/articles/l/evaluation-at-the-v-and-a/> accessed 27th October 2017.

Results

Objects in a museum case (Fig. 4)

Many of the general groups saw the material behind the case as both art and artefact. There was an interesting divide though in the classification of the material: if it was functional (e.g. bowl/lamp) it was often seen as artefact. Something that was decorated or figurative, e.g. the figurine or the sgraffito bowl, was seen as art. While this response reflects traditional views of art, many people across the groups questioned the definition of art.

It was notable that across the groups, and including the group that visited the case last, the experience of the material in the museum case was much more of a contemplative and solitary process. While engagement for adults with the 3D material was similarly a solitary process, individuals spent considerably longer with the 3D material than the museum case (at least 5 mins per 3D object).

Objects in the handling box

For many of the children (in both groups) this was an enjoyable part of the session but they favoured the 3D format more. It is possible that elements of mystery were drawing them in. In contrast to children, some adults hesitated about sticking their hands into the box.

In some respects the data collected from the handling box was the most surprising element of our observations from the focus groups. For many participants, the ability to feel the object without using the other senses increased levels of engagement, but importantly for this study, the box made the majority consider the function of the object rather than its artistic value. This was (like the handling session) because they could feel the weight, form and texture of the material. It could be argued that as the objects were replicas this may have impacted on participants' views; that is to say that they were seen as functional and not as art, but we believe that most participants did not consider them as reproductions once they actually started handling the object. However, some did suggest that feeling reproductions took the aura or mystery away from the object.

It was notable that there was lots of discussion across the groups about the material in the handling boxes and they would go back and forth between the reproduction and the actual object in the museum case to try and understand it. Participants noted that the handling box and museum case as a combination worked really well and the handling box encouraged much more engagement with the case.

Objects in 3D

The children were more inclined to treat the format of the 3D material as a talking point than the adults and two-thirds of those asked preferred this method of examining the objects over all the others. The children would look more at what the other children were doing on the computers and chat to each other about it.

For adults it was a very solitary experience and although it kept their focus, at the same time many of the older adults felt distant from the material or that the 3D format isolated the material even more. Once they were shown the potential for discovering contextual relationships there was more engagement.

It was noticeable that of the adults, the groups who reacted most positively to the 3D material were the student Archaeology Society (though notably not St Andrews Archaeology Society) and the Anthropology students. Their familiarity with handling and studying artefacts may have encouraged them to explore the on-line site to find details of context and other associated material culture¹⁸. Both groups also commented on the research value of the 3D scans which highlights their experiences of and thus different approaches to material culture.

Interestingly, those with archaeological backgrounds did not identify more of an art feel from the objects in 3D. Many people (Groups 3, 5, 7) requested a scale for the 3D objects which reflects in fact the amount of consideration they had of the objects.

¹⁸ Students in the student archaeology society were much more concerned to try and find out more about context. Many navigated themselves through the computer material in order to try and find this out. St Andrews archaeology society were frustrated by what they perceived as a lack of context but were not as savvy in terms of finding out the data themselves.

On the whole, other participants felt distanced from the material and saw it as further divorced from the original but they appreciated the 3D format in terms of the close up views it afforded. Whilst people could see more features there was general agreement that the object seemed less functional in 3D. One person said, “in a case it felt like a treasure but on the computer it felt like just another computer image – one of hundreds that are available on the internet. It felt less important once it was on the computer.” Group 4.

Interestingly, those with archaeological backgrounds did not identify more of an art feel from the objects in 3D while others without, did so. For example from a non-archaeology participant, Group 1; “I think for the case and the 3D images the objects are seen in abstract – I view it more as art. The handling gave me a much better idea of functionality and hence I saw this from an archaeological lens and as an artefact”. In contrast, Group 5; “you almost feel you can handle the objects on the computer whereas with art you are distant”.

With the first mixed university group, a few participants commented that they liked the doing part of the 3D images. They enjoyed being actively engaged with the material through the 3D images; “The website gives a very good overview of the context. The maps are very useful. The website also is divided into different categories so that it gives further context.” Group 1. Similarly the archaeology and anthropology students had analogous comments: the digital version was a good “research tool which puts the objects in the ‘artefact’ category.” Group 5.

Object handling

Whilst adults visibly enjoyed and expressed excitement about handling the original artefacts, not as many of the children felt this to be the case. The majority of children felt they engaged more with the 3D objects (and certainly this format generated the most animated discussion in this age group).

All of the adult participants liked the way they could see and feel details of the objects during the handling session. This combination allowed them to feel more connection with the craftspeople responsible, and as such, it sparked their imaginations to think about the object itself, its decoration, meaning and function. In many cases, as with handling the replica, participants in all groups said they were surprised by the weight of the object and also they felt that it added more to the perception of the object as utilitarian.

Observations

There was definitely an increasing sense of understanding and curiosity about the material with every new experience. We observed many people discussing the material after they had experienced it in a couple of formats. Often participants would go back and forth between the formats to re-examine the material culture. Participants commented on this in most sessions and further comments include; “having used the computers it was clear that the display case had been curated in a certain way to gain access to context” Group 5. The combination of material and techniques complement each other: “Combining handling and visual gives better insights” Group 3 and it was “good to have both the handling box and the 3D renderings” Group 6.

Most participants agreed that touching the objects made them feel more functional (in particular the spindle whorl (fig. 1). “Touchability makes them more functional” Group 3. Interestingly, many also believed that they engaged more with the object when they were able to feel it (not see it) in the handling box and this worked particularly well when the box was next to the glass case of objects. For many of the older participants, the 3D format created more of a barrier with the object.

Many participants (with the exception of the archaeology society and anthropology students) said that non-decorated objects seemed more like artefacts and that decorated items could be interpreted as art. When in the museum case, the differences between art and artefact came down to the décor. When the objects were felt (without vision) they became much more utilitarian. Consequently, perception of material culture as art or artefact is not solely dependent on how it is experienced.

The test results of the visual no touch and manipulation through 3D experiments showed that without a good visual understanding of the original archaeological context, most visitors classified the majority of objects as art rather than artefact. Furthermore, while many participants questioned what art was and how it could be defined (particularly in the adult groups), not a single person was concerned with the meaning of an artefact. Another pertinent result is that 3D provision in isolation

has no more impact on overall understanding of material than examining the material in a glass case. Furthermore, while younger audiences were engrossed with the 3D material, it was used as a means of then engaging with the original objects and their labels rather than learning directly from the 3D image. Even when contextual information was provided it was either sidelined or ignored so that the visitors' overwhelming view was of an object in isolation. This is particularly pertinent as museums focus on the important roles they have in allowing visitors to reconstruct an object's history and not just focus on its aesthetic value (SYLAIU et al. 2010, 244).

It is clear from the data presented above that object handling sessions have the most potential to engage visitors and help them understand the function and context of the material. Conversation regarding the perception of the archaeological material as art or artefact was well-considered and debated and many commented that "discussion helped understanding" Group 3. In contrast, material in a museum case was not given significant consideration and was often hastily classified as art or artefact. Discussion at the museum case was kept to a minimum (if any at all). This is a tradition which has been well explored in the past and is not the same for museum visitors across different cultural traditions (APPADURAI & BRECKENRIDGE 1999). Moreover, the session observers noted that there was significantly more interaction with the objects in the case once participants had investigated the handling box. This format also encouraged discussion. Handling the replicas made all participants (without exception) consider the utilitarian side of the material and in some cases even changed individuals' original interpretation:

"The context of the pieces matters the most in how I see them. If the objects are behind a case, it seems more like art, whereas handling it made it more like an artefact because it stops being purely aesthetic and I can see the functional aspects of it" Group 1.

It was quite obvious, however, that those individuals who were currently students of material culture were not happy to engage with replicas, echoing Stogner's (2009, 7) point that museum-goers expect to view genuine items or it can have a negative impact on their visit.

The virtual representations were very popular with younger participants, as they picked up the exploration of the 3D objects quickly. They enjoyed being able to closely examine any texture or pattern and they discussed the objects in detail amongst themselves. The children seemed less interested in the written context and information about the objects alongside the 3D image, but were more inclined to offer their own observations of the potential uses of the material than adults. The handling sessions allowed the children to examine one object at a time, slowing down their discussion of the material. Many studies have supported the theory that children are more open-minded learners (LUCAS et. al, 2014) than older audiences. In our handling sessions it was clearly evident that children are more able to perceive the potential uses of an object than adults and correctly identify the material such as the terracotta bell or the baby feeder¹⁹. There were some adults who were able to identify a few familiar objects such as the perfume bottle, albeit less frequently. That the children preferred the 3D format more than the real handling may reflect current trends among younger generations. On the whole, younger generations employ digital technology so frequently that they are much more comfortable using it to help them understand objects and the world around them. Conversely, the handling box which is usually thought of as a child-orientated aid in museums, was not as well-liked among our children but in fact encouraged a great deal of discussion amongst adults.

Conclusions

In our study, subjects noted that handling and engaging with the objects, feeling their weight and gaining insights to their production, made it much more likely to perceive them as archaeological artefacts. As several participants noted, touching 'art' is generally discouraged, and so being able to handle the material encouraged them to perceive the objects as tools to be used. We can make academic judgements about the original context for the material but for the most part, when viewed in isolation (in a display case or in digital form) the objects are seen primarily as art rather than artefact. Within this broad view there was a sense of a scale: decorated pieces regardless of function, or figurines were seen as more artistic than non-decorated items. For example, the incised spindle whorl (fig. 1), a fundamentally functional object was seen as art. Contrary to the other groups, the Archaeology and Anthropology students did not perceive the digital material as art.

¹⁹ http://www.alisongopnik.com/papers_alison/Current%20Directions%20in%20Psychological%20Science-2015-Gopnik-87-92.pdf
<https://cocosci.berkeley.edu/papers/WhenChildrenAreBetter.pdf>

Although there were differing views on the 3D medium itself, this format did not alter perceptions of the objects as art or artefact. It remained primarily a visual experience for most and therefore less artefactual than artistic. For some, this was because material culture was equated with ‘treasure’ when it was untouchable, but the ability to handle it made it seem more ordinary.

Furthermore, a sense of authenticity of the artefact is fundamental to positive engagement (STOGBER 2009, 391). This was particularly visible in the reactions of the Archaeology and Anthropology students who did not enjoy the sensory box experience of the replica artefacts. Moreover they viewed the 3D objects as different from replicas and more as a tool of research value. In saying that, a more recent study undertaken by Cooke et al. (2014, 14) suggests that there is not yet enough empirical research to understand what the “relative cultural value” of engagement with the real and digital object is.

One of the project’s key aims was to reinsert context discreetly to encourage an appreciation of both the aesthetic and archaeological value of the Bridges collection. What we learned however, was that although some visitors were happy to read museum labels, only certain groups (the Archaeology and Anthropology students) were willing and/or able enough to successfully navigate their way through the digital media to the contextual information. Gell (1996) noted the significance of an object’s context when defining it as art. This highlights the importance of the role museums play in promoting archaeological contexts and the tangled history of the object. Similarly, Classen and Howes (2006: 217) questioned whether the symbolism or the function of the object would be better understood by anyone, especially outside of its original cultural context, if a more enhanced sensory experience was available. In terms of our work, the answer is most definitely yes. While our provision of context in digital form did not necessarily work for all our users, it complemented other sensory experiences, enhancing the experience overall.

Hooper-Greenhill (2000, 7) indicated the difficulties museums face in being user-friendly and attractive without losing intellectual content. Certainly the provision of contextual data enhances the potential for an enticing and contemporary means of examining material culture, going beyond museum labels. However, even though such data may be provided, it is not always sought after, as we found with the 3D format.

The digitisation of the Bridges’ collection has enabled a more enhanced understanding of the value of digital media in museums. For those (specialists) who wanted to explore the digital format, the provision of original context information in the form of plans, images and other associated material culture is better enabled through the virtual form. However, for a wider audience, the overarching value of providing a 3D image is that it makes material accessible; it can be viewed from multiple angles and at high magnification, allowing detailed observations otherwise unavailable when simply seen in a museum case (BRUNO et al. 2010). While digital images cannot replace the more embodied sensory experience of handling the object, the ability to turn and manipulate the object at least provides another sensory layer to a self-directed or virtual visit. In turn, this created more consideration and discussion of the original material. Classen and Howes (2006, 218) emphasise this point, noting that sensory content on its own is not going to deepen one’s understanding of the object, but with more contextual detail through labelling and visuals as well as different media, it is further enhanced.

Our research has shown that the provision of a wide range of sensory experiences engages diverse audiences and facilitates learning. Detailed audience research and learning theories, including various interpretations of Gardner’s (2006, 8-38) multiple intelligence theory, have played an important role in shaping museum approaches to exhibition design over the last few decades. Factors such as age, educational level, additional support needs, cultural background, interests and motivation for visiting all affect the visitor’s interaction with museum objects and their understanding of the exhibits. The application of constructivist theories, (e.g. HEIN 1995) has seen the rise of discovery oriented approaches to learning in museums, whereby exhibition design encourages visitors learn by experience and construct their own knowledge. The influence of visitor group dynamics, especially within families, has also been studied in detail (FALK & DIERKING, 1992 & 2000; HOOPER-GREENHILL 1994; STERRY & BEAUMONT 2005; TISON POVIS & CROWLEY 2015), and there are excellent examples, particularly in science centres, of hands-on exhibits encouraging learning through social interaction amongst visitors – be it competing in a game or working as a team to solve a puzzle or construct a model. In our experiments this behaviour occurred spontaneously when the children were exploring the 3D images, and the experience could arguably be made more powerful if the 3D images were integrated into a game with defined learning outcomes. A further issue impacting upon

current museum design and programming is wellbeing. There is an increasing body of research suggesting that the sense of touch can have therapeutic value, including in work with dementia sufferers (CAMIC & CHATTERJEE, 2015). Many museums have developed successful initiatives such as Tunbridge Wells Museum's dementia toolkit for handling sessions and Liverpool Museums' House of Memories digital app. Both of these projects use their collections to help people make connections, to support learning and improve wellbeing²⁰.

Because of security and preservation concerns, museums mostly only offer handling of original artefacts at specific events or study sessions, but may provide replicas or 'props' to explore in the galleries. Our results show that the chance to handle objects allows visitors to experience a sense of connection with the maker and appreciate its original function, and for a 'non-expert' audience, replicas are equally useful. In some museums, handling material and interactive exhibits are located in dedicated Discovery Centres, away from the original artefacts. Whilst this may help in creating separate noisy and quiet zones within the museum, there would appear to be far more learning potential when artefacts are displayed alongside handling items, 3D reconstructions and other forms of interpretation. Although adults and people with prior knowledge/experience of archaeology were more reluctant to try the handling box, it was striking that this technique resulted in much more detailed descriptions and conclusions about the objects. By eliminating the sense of sight and all contextual information, it forced participants to engage actively with each object on its own terms. In seeking to prolong the life of their collections, it may be that museums unconsciously privilege sight among the range of sensory experiences they could provide. As Woodall (2013) observes, this was not always the case. In 17th century cabinets of curiosity, "handling was absolutely central to collectors' and visitors' encounters with collections. Passing round objects to feel, observe, even smell was part of the experience."

In the introduction we noted two key questions regarding the use of digital media in museums: does it appeal to all and what impact does it have on perceptions of material culture? There are varying and surprising views on use of digital media. It does not necessarily appeal to all and for different reasons. Some do not like the demystifying of the museum experience. Others simply found the format too unfamiliar. Younger visitors were clearly enthralled with the digital form, it sparked discussion, and in many respects, it is this group that will help to broaden and boost museum audiences.

In terms of perception of the material culture, while it is clear that not every group or individual had consensus regarding the best way to interpret material culture there are ways of increasing engagement and flexible thinking. Good labelling and visual aids to link to context are fundamental; the addition of further opportunities for sensory engagement (touch, virtual manipulation) encourages visitors to engage with an object and to think about it on a range of levels. As organisations committed to accessibility for all, museums must allow for obvious differences in views, between older and younger participants, as well as those who have archaeological training or specialist knowledge, and those who have not. Developing flexible approaches to the presentation of material culture will continue to be both necessary and a challenge.

Furthermore, provision of information on the entangled history of an object allows visitors to reach a more enhanced understanding of its cultural context: and not one that can be simply diluted to being art or artefact. Based on her work on the Pasifika styles" at the University of Cambridge Museum of Archaeology and Anthropology and at the Metropolitan Museum of Art Wonu Veys (2010) argued that distinguishing between art and artefact is not necessarily helpful and that individual perceptions can lead to numerous interpretations. While it is true that distinctions between art/artefact and good/bad will not necessarily push viewer interpretation forward, such reactions are understandable in light of the fact that a central role of a museum is to catalogue, classify and select.

²⁰ Tunbridge Wells Museum and Art Gallery, 2015 . Dementia Toolkit. <https://www.museumsassociation.org/download?id=1150803> (accessed 20/08/2018)

Liverpool Museums 'House of Memories' project and app: <http://www.houseofmemories.co.uk/> (accessed 20/08/2018)

We have learned that it is not enough just to provide the object in digital form in a passive way. Classen and Howes (2006, 219) argue that even the ability to handle the material doesn't always mean that the cultural meaning will be understood. They suggest a range of senses (sound and smell) should be employed to make this a more realistic possibility (CLASSEN & HOWES 2006, 219). The more active physical exploration of the object enables contextual connections to be made as well as an understanding of the entangled life of the object. Drori (2010) argued that digital technology changed the product or experience. However, our experiments have shown that when the experience was more visual (in the museum case and on computers) it biased people towards an artistic interpretation, whereas when the experience was more physical and tactile (sensory box and handling) it encouraged them to think about function. This would also explain why object handling was generally the most effective and rewarding – it employs all senses simultaneously. For our own project development, it is clear from our user analysis that to enable deeper understanding of context, the first digital platform of engagement with the object should be through its archaeological context and then the object.

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Literature cited

- ALBERTI, S.J.J.M. 2005. Objects and the Museum, *Isis*, 96 (4): 559-571.
- ARNOLD-DE SIMINE, S. 2013a. *Mediating Memory in the Museum*, London: Palgrave Macmillan.
- ARNOLD-DE SIMINE, S. 2013b. Phantasmagoria and Its Spectres in the Museum. In *Mediating Memory in the Museum*, S. ARNOLD-DE SIMINE (ed.), (London: Palgrave Macmillan), 187-200.
- APPADURAI, A. & BRECKENRIDGE, C. 1999. Museums are good to think: heritage on view in India. In *Representing the Nation: A Reader. Histories, Heritage and Museums*, Eds. D. BOSWELL AND J. EVANS (London: Routledge), 404-420.
- BLACK, G. 2012. *Transforming Museums in the Twenty-First Century*. Abingdon: Routledge.
- BOSWELL, D. & EVANS, J. (eds.) (1999) *Representing the Nation: A Reader. Histories, Heritage and Museums*, London: Routledge.
- BRODIE, N., & RENFREW, C. 2005. Looting and the World's Archaeological Heritage: The Inadequate Response. *Annual Review of Anthropology* 34, 343-361.
- BRODIE, N., KERSEL, M. M., LUKE, C. & WALKER TUBB, K. (eds.) 2006. *Archaeology, Cultural Heritage, and the Antiquities Trade*. Gainesville: University Press of Florida.
- BRUNO, F., BRUNO, S., DE SENSI, G., LUCHI, M-L., MANCUSOC, S. & MUZZUPAPPAA, M. 2010. From 3D reconstruction to virtual reality: A complete methodology for digital archaeological exhibition. *Journal of Cultural Heritage* 11, 42-49.
- CARROZZINO, M. & BERGAMASCO, M. 2010. Beyond virtual museums: Experiencing immersive virtual reality in real museums. *Journal of Cultural Heritage* 11: 452-458.
- CAMIC, P. & CHATTERJEE, H. 2015. The health and well-being potential of museums and art galleries. *Arts and Health*, 7:3, 183-186
- CHATTERJEE, H. (ed.) 2008. *Touch in Museums. Policy and Practice in Object Handling*. Oxford: Berg.
- CLASSEN, C. & HOWES, D. 2006. The Museum as Sensescape. *Western Sensibilities and Indigenous Artifacts*. In *Sensible Objects: Colonialism, Museums and Material Culture*, eds. E. Edwards et al. (Oxford: Bloomsbury) 199-222.
- COOKE, P., KING, L. & STARK, J. 2014. *Experiencing the Digital World: The Cultural Value of Digital Engagement with Heritage*. AHRC The Cultural Value Project. http://www.digitalheritage.leeds.ac.uk/files/2014/10/AHRC_Cultural_Value_CR-Experiencing-the-Digital1.pdf (accessed 27th October 2017).
- CRUICKSHANK, C. 2015. *Exploring the Role of Digital Collections in Museum Education and Engagement: Planning, Facilitating and Evaluating*. (Unpublished MLitt project, University of St Andrews).
- Culture24. 2012. Let's get real: How to evaluate success online? Report from Culture24 Action Research Project. <https://www.keepandshare.com/doc/3148918/culture24-howtoevaluateonlinesuccess-2-pdf-september-19-2011-11-15-am-2-5-meg?da=y> (accessed 27th October 2017).

- DIN, H. & P. HECHT 2008a. *The Digital Museum: A Think Guide*. Washington: American Association of Museums.
- DIN, H. & P. HECHT 2008b. Preparing the Next Generation of Museum Professionals. In *The Digital Museum: A Think Guide*, eds. DIN & HECHT (Washington: American Association of Museums), 9-18.
- DODD, J., JONES, C., SAWYER, A. & TSELIU, M. 2012. *Voices from the Museum: Qualitative Research Conducted in Europe's National Museums*. EuNaMus Report No 6. <http://liu.diva-portal.org/smash/get/diva2:572100/FULLTEXT.pdf> (accessed 27th October 2017).
- DRORI, J. 2010. In *Encouraging Digital Access to Culture*. Department for Culture, Media and Sport, p.5. http://fm.typepad.com/files/dcms_encouraging_digital_access_to_culture.pdf (accessed 29 August 2016)
- Department for Culture, Media and Sport 2016. *The Culture White Paper*. <http://www.gov.uk/government/publications/culture-white-paper> (accessed 29 August 2016).
- DI PIETRO, L. MUGION, R. G., RENZI, M.F. & TONI, M. 2014. An Audience-Centric Approach for Museums Sustainability. *Sustainability* 6(9): 5745-5762.
- EDWARDS, E., GOSDEN, C. & PHILLIPS, R. (eds.) 2006. *Sensible Objects: Colonialism, Museums and Material Culture*. Oxford: Bloomsbury.
- FALK, J. H. & DIERKING, L. D. 1992. *The Museum Experience*, Washington, D.C: Whalesback Books.
- FALK, J. H. & DIERKING, L.D., 2000. *Learning from Museums: Visitor Experiences and the Making of Meaning*, Walnut Creek: AltaMira Press.
- FALK, J. H. 2009. *Identity and the Museum Visitor Experience*. Walnut Creek: Left Coast Press Inc.
- GARDNER H. 2006. *Multiple Intelligences: New Horizons in Theory and Practice*, New York: Basic Books.
- GELL, A. 1996. Vogel's Net: Traps as Artworks and Artworks as Traps. *Journal of Material Culture* 1(1): 15-38.
- GILL D. W. J., & CHIPPINDALE, C. 1993. Material and Intellectual Consequences of Esteem for Cycladic Figures. *American Journal of Archaeology* 97, 601-659.
- HEIN, G.E. 1995. The Constructivist Museum. *Journal for Education in Museums* No. 16, 1995 p21-23.
- HILPINEN, R. 2011. 'Artifact', in *The Stanford Encyclopedia of Philosophy* (Winter 2011 edition), ed. E. N. Zalta. <https://plato.stanford.edu/archives/win2011/entries/artifact/>. (accessed 30 August 2016).
- HODDER, I. 2011. Human-thing entanglement: towards an integrated archaeological perspective. *Journal of the Royal Anthropological Institute* 17, 157-177.
- HOOPER-GREENHILL, E. 2000. *Museums and the Interpretation of Visual Culture*. London: Routledge.
- JARRIER, E. & BOURGEON-RENAULT, D. 2012. Impact of Mediation Devices on the Museum Visit Experience and on Visitors' Behavioural Intentions'. *International Journal of Arts Management* 15 (1): 18-29.
- LATIMER, S. 2011. Art for Whose Sake? In *Museum Gallery Interpretation and Material Culture*, J. FRITSCH (ed.) London: Routledge: 67-77.
- LUCAS, C. G., BRIDGERS, S., GRIFFITHS, T.L. & GOPNIK, A. 2014. When children are better (or at least more open-minded) learners than adults: Developmental differences in learning the forms of causal relationships. *Cognition* 131(2): 284-299.
- MALVERN, S. 2000. War, Memory and Museums: Art and Artefact in the Imperial War Museum. *History Workshop Journal* 49: 177-203.
- NELSON, M. & COHN, S. 2015. Data Collection Methods for Evaluating Museum Programs and Exhibitions. *Journal of Museum Education* 40(1): 27-36.
- OAKLEY, J. H. 1998. Why study a Greek vase-painter? – A response to Whitley's 'Beazley as theorist', *Antiquity* 72 (275) 209-213.
- PARRY, R. 2007. *Re-coding the Museum: Digital Heritage and the Technologies of Change*. London: Routledge.
- PARRY, R. 2009. *Museums in a Digital Age*. London: Routledge.
- PARRY, R. 2011. Transfer Protocols: Museum Codes and Ethics in the New Digital Environment, in *The Routledge Companion to Museum Ethics*, J. MARSTINE (ed.) London and New York: Routledge: 316 -331.
- PEARCE, S. (ed.) 1994. *Interpreting Objects and Collections*. London: Routledge.
- PUTNAM, J. 2009. *Art and Artifact. The Museum as Medium*. London: Thames and Hudson.
- SCHUSTER, E. 2014. How much is too much technology in a science center or museum, or is the sky the limit? Does it engage or distract? *Dimensions*. <http://www.astc.org/astc-dimensions/how-much-is-too-much-technology-in-a-science-center-or-museum-or-is-the-sky-the-limit-does-it-engage-or-distract/> (accessed 27th October 2017).

- STERRY, P. & BEAUMONT, E. 2005. Family Group Visitors to Museums and Art Galleries in the UK Victoria & Albert Museum Phase 1 Report. http://www.vam.ac.uk/__data/assets/pdf_file/0008/178748/family_groups_phase1_2005.pdf (accessed 20/08/2018)
- STOGNER, M. B. 2009. The Media-enhanced Museum Experience: Debating the use of Media Technology in Cultural Exhibitions. *Curator: The Museum Journal* 52, 385–397
- SYLAIIOU, S., LIAROKAPIS, F., KOTSAKIS, K., & PATIAS, P. 2009. Virtual museums, a survey and some issues for consideration. *Journal of Cultural Heritage* 10, 520–528.
- SYLAIIOU, S., MANIAB, K., KAOULISA, A. & WHITE, M. 2010. Exploring the relationship between presence and enjoyment in a virtual museum, *Int. J. Human-Computer Studies*, 68, 243–253.
- THOMAS, N. 1991 *Entangled Objects: Exchange, Material Culture, and Colonialism in the Pacific*. Harvard: Harvard University Press.
- THOMAS, S. & MINTZ, A. (eds.) 1998. *The Virtual and the Real: Media in the Museum*. Washington: American Association of Museums.
- TISON POVIS, K. & CROWLEY, K. 2015. Family Learning in Object-Based Museums: The Role of Joint Attention, *Visitor Studies*, 18:2, 168–182
- VALLANCE, E. 2008. Visual Culture and Art Museums: A Continuum from the Ordinary Author(s). *Visual Arts Research* 34(2) 45–54.
- VERGO, P. 1989. *The New Museology*. London: Reaktion Books
- Victoria & Albert Museum, 2017, *Designing the V&A*. www.vam.ac.uk/articles/building-the-museum (accessed 20/08/2018)
- WHITEHEAD, C. 2009. *Museums and the Construction of Disciplines*. London: Duckworth.
- WHITLEY, J. 1997. Beazley as Theorist. *Antiquity* 71 (271), 40–47.
- WONU VEYS, F. 2010, Art or Artefact: Is that the Question? “Pasifika styles” at the University of Cambridge Museum of Archaeology and Anthropology, and the refurbishment of the Michael Rockefeller Wing at the Metropolitan Museum of Art. *Paideuma: Mitteilungen zur Kulturkunde* 56: 263–278.
- WOODALL, A. 2013. Sensory Access to Museum Objects. *Museum Practice*. <https://www.museum-sassociation.org/museum-practice/touch/15022013-sensory-access-to-objects-in-museums> (accessed 20/08/2018)

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Keywords

Digital Media - Art - Artefact

Appendix

Collated questionnaire results

Total engagement: 94

In focus groups and 40 online forms: 134

The material presented here is a summary of answers to our questions, considerations from the participants and observations from each of the nine sessions. The data is pulled together at the end to draw out a number of points of comparison and divergence with some overall suggestions for further application of the data.

Group 1: Mixed Faculty Undergraduates: 8

There was a wide range of nationalities. Many frequented museums and two were embarking on the study of archaeology at degree level. They only spent a few minutes at the cases and there was no real discussion about them. However, this changed once they were able to engage with the material. Exploring the 3-D scans increased the discussion and there was interest in the process but less to do with the actual object. In saying that, a couple of people did really like this format. One person commented that they felt that they 'became an amateur archaeologist'.

When using the handling box, because they couldn't see the object they felt that this was the point that it was most functional; the art side was in a sense erased. When they were able to handle the material this was when discussion and interest was really piqued. They commented on the fact that the weight of the objects made them seem functional whereas they were less so when they were behind the glass case.

There was a mixed response to the question of whether the archaeological material was art or artefact. Some very clearly saw the objects in a case as art. Many participants questioned what was meant by art. Many noted that bowls/lamps were seen as functional objects while figurines were seen as having artistic merit. 'If it is a bowl or lamp etc. then I see it as a functional object rather than art. But then if it is a figurine it is easier to see its artistic merit', Group 1. One person raised the point about desires to see original objects and how they went to museums with the intention of seeing such objects (not replicas) and that the 3-D material was to them was more archival than for display. Many agreed that they liked the combination of different sensory experiences with the material. 'You get different perspectives from viewing and handling them (the material culture). It is easier to gain context with all the different views of them'. Group 1.

Group 2: Children (Young Archaeologists): 12

The children ranged in age from 7-12. They had some knowledge of archaeology through their monthly meetings. They found it difficult to engage with the material in the case, the answers to their questions were very specific (more so than adults) showing that they focused in on an object rather than thinking broadly about it. The children enjoyed the 3-D format more than the museum case. They were able to examine the whole object and zoom in and out. This generated lots of discussion but they were a bit haphazard and flew through the material once they figured out what they could do with it. There were some interesting results of the handling box session. Because the box was divided into four compartments, each containing a single object, the children could only handle one item at a time. This slowed them down and helped them to focus on a specific object and its attributes. Then they were keen to answer the questions and explore more. This seems to have been the format that created most focus. The hands-on session generated lots of questions but in fact by the time we got to this stage the children were already very familiar with the objects so it wasn't as interesting to them as it might have otherwise been.

Group 3: Archaeology Society (interested adults): 5

Majority saw the objects in the case as archaeological (this is what we would expect given their training). They had also read the labels in detail. Interestingly, those who did not have a degree in archaeology felt the 3-D format was archaeological but those without a degree saw it more as art, again because of the way you could manipulate it and see it from all angles. Once they were told about the context it became a bit more archaeological. The 'ability to touch an object makes it more functional'. One noted 'presumably they are in the case because they have archaeological value'. Another noted the difference between a functional object (no décor) and an art object (décor). Although many viewed the material as both art and archaeology, the group was keenly concerned with the meaning of art and discussed the topic in depth.

Group 4: Public/Student Group (September): 8

A mix of students and the general public (2 non-students) who had little experience with archaeology. Their view of the material was that it was primarily artefact and some noted that there was art because of the intricate designs. Single objects in the case tended to grab individual attention and they were able to talk about them when asked. As with other groups before them, many individuals commented that they found that the objects in the handling box were more practical than artistic; they felt 'functional', 'sturdy', 'robust', 'less fragile'. Further to this, some noted that they could feel patterns but as they couldn't see them, they were unsure if they were intentional artistic elements: 'as I was able to continue to feel the object I could tell that the object was man-made rather than natural and that it was a functional object'. One person said they didn't like the idea of a replica as it wasn't an authentic experience; another person commented that touching the objects was more interesting than the display. Some believed that being able to touch the object made it less like a work of art: 'it cannot be an art object if you are allowed to touch it, as art objects are revered and you are not allowed touch them'. A small number of students perceived a change in the nature of the objects in 3-D form which was partly fuelled by the sense of remove that participants felt was created by the 3-D format: 'When in the case, you got a sense that the objects were a group and could get a sense of where they might have come from. Whereas on the screen they all seem isolated, distinct items.' With the handling session, participants noted the utilitarian function of the object. There was much more enthusiastic discussion of the objects and more willingness to engage with others in trying to understand the object.

Group 5: Student Archaeology Society: 12

The students asked lots of questions at the museum case and considered the material culture as both art and archaeology. One person noted that the objects were 'presented archaeologically in the case'. There was a considerable amount of discussion at the museum case but much more so at both handling sessions. Unlike any other group, they did not respond well to the handling box. Many actively said they would avoid it in a museum had it not been part of the structured focus group session. The 3-D format was most popular after the handling of the original objects. Only one object identified as art: the sgraffito bowl. One person noted that: 'you lose some of the artistic value when you see the 3-D representations'. A number of students noted that the 3-D format encouraged something of a research approach to the material and thus further appreciation and exploration. This group found the context connections easily: 'looking in 3-D was more like examining than appreciating'. As with others, the handling session encouraged discussion as well as comments regarding the utility of the object.

Group 6: Museums and Galleries Studies Students: 10

Most saw the material as archaeology (not art) because of the range of material on display. Others thought that any pottery was archaeology and a found object was an archaeological object. The 3-D format did not change the views, all but one saw the objects as archaeological. This group really enjoyed the handling box in terms of getting a sense of the object. It was 'fun to figure out what it is – more of a hands-on approach'. A small number of people said they preferred this to 3-D. All said they would approach the box and interact with it in a museum context. It was also commented that the box was good for accessibility, for example for partially sighted people. Another person said: 'Feeling and looking is a good combination – get you to use more of your senses'. Handling the real objects allowed more connection with the craftspeople/makers etc. They all felt that handling the objects encouraged them to think about the objects as having a sense of purpose. NB although all students noted they liked the handling session best, some said that they felt they got more out of the 3-D experience in terms of encouraging them to think about the object by being able to zoom in and see the details up close. They also mentioned that they felt inspired and that the website enabled them to go and explore more at home.

Group 7: Public/Student Group (October): 6

A mix of students and members of the general public. It should be noted that many people had museum experience in this session. To see if the order in which people experienced the material was impacting on their interpretation, the order of activities in this session was changed. In this instance, first the participants handled the real objects, then they worked with the material in 3-D, this was followed by the feely box and then museum case. Handling: the group consensus was that they were archaeological objects with artistic merit. They had a function. One person said that objects looked archaeological as they had been excavated and this generated discussion about whether an object was archaeological because it has been excavated... even if it was art. This group really appreciated the 3-D format. Comments included "in the ideal world I would handle everything I want in a museum, but if I can't; then 3-D is the next best thing". This group were excited about the potential for access to collections and for research too. They noted (as others did) that 'they might not have come to the same conclusions about the object if they had only used the computer'. When handling the material without viewing it, participants here noted that they had no fear of harming or the object and this helped them to understand it as utilitarian. They noted that they were able to hold the object as one would if one were using it. This led them to discuss the fact that because the objects felt robust they were more like household objects. Another commented that as they couldn't see they were forced to call on other senses to think about the material 'the handling box de-familiarises the object because you can't see it. One is so used to looking and using observation to come to conclusions, whereas the handling box forces you to use your senses, focus on the tactile aspect and experience.'

Group 8: Anthropology Students: 22

A significant majority of students felt that the material culture was both art and archaeology (12) and they questioned whether the classification mattered in the first place. With this group we reversed the order of experiencing the objects. The students approached the 3-D material first and then they handled it, so we could assess how participants responded solely to the 3-D renderings with no prior experience of the material at all. This sequence meant that students commented a lot on the scale of the objects- finding it hard to visualise the objects based solely on the screen. One girl thought the spindle whorl was a bowl until observers pointed it out in the case. This highlights how the 3-D format has to be carefully established, so as not to allow false perceptions of the material to arise. In terms of the 3-D experience and handling there were some interesting comparisons: many liked both handling and 3-D but as with group 7 before them, those who were looking at the 3-D liked the fact that they could not damage the object. One noted that the 3-D form made the objects more accessible and perhaps better in terms of conservation. There were a mix of preferences for use of the material in terms of research, some believing that 3-D was more profitable than original (and vice versa).

Group 9: Lawhead after school club (age 5-11): 11

The children considered the material to be archaeology. This may be a bit skewed as Lawhead have had quite a number of archaeology talks and know an archaeologist.

The children's experience of the 3-D images was interesting because as soon they played with the images they considered it more art than archaeology. They felt that the material looked a bit more fragile on the computer and you could get a sense of how it was made in the detail provided by the 3-D format. The children liked that they could see more details and that they could zoom in. As such the computer allowed more interaction and they could do it at their own pace. The children also felt that they could focus more with the computer. The handling box was very popular with the children and many were surprised by the weight of the objects. They could feel the décor, and in fact, many as a result felt that the objects (even though they identified them with the objects in the case) were now a mix of art and archaeology (6 children). This number increased slightly with the hands-on session. The majority of students liked the 3-D images best (7) while 3 liked the handling box and 3 liked holding the real object (some liked both).