A Closer Look: Multi-Sensory Accessible Art Translations

Matthew Butler
Monash University
Melbourne, Australia
Matthew.Butler@monash.edu

Leona Holloway
Monash University
Melbourne, Australia
Leona.Holloway@monash.edu

Kim Marriott
Monash University
Melbourne, Australia
Kim.Marriott@monash.edu

ABSTRACT
Providing people who are blind or have low vision with accessible versions of artworks is important not just for equity, but also for inclusion, greater engagement with the community at large, and raising awareness about these issues. In 2018, a value-sensitive design methodology was used with the Bendigo Art Gallery and key stakeholders to develop a model that provides three different ways of accessing the gallery, depending upon visual acuity and mobility: virtual tours, self-guided tours and guided tours. As a pilot implementation of the model, we developed different tactile representations of key artworks using tactile graphics, laser-cut layered graphics, 3D printed models, soundscapes, role plays, and a website featuring information and representations requested by workshop participants. To highlight the work, this paper will present two of the key works in more detail to highlight different representations that should be considered when presenting accessible artworks.

Author Keywords
accessibility; art; blindness; low vision; 3D printing

INTRODUCTION
Galleries and museums are public institutions designed to provide the whole community with access access to artworks and artefacts of cultural significance. However, due to the visual and fragile nature of the majority of their exhibits, the vision impaired community are often excluded.

Bendigo Art Gallery (BAG) is a regional gallery in Australia with a reputation for high quality international exhibitions. We collaborated with BAG to explore technologies for the creation of accessible versions of artworks in their collection. This work is documented in [9] with emphasis on the use of Value Sensitive Design methodology to explore stakeholder priorities and conflicts. Here, we present more detail about the accessibility solutions designed for two key artworks.

This study asks: How can new technologies be combined with more traditional methods to provide an inclusive and engaging experience for vision impaired gallery visitors?

ASSETS '19 October 28–30, 2019, Pittsburgh, PA, USA

ACM ISBN 978-1-4503-6676-2/19/10.
DOI: https://doi.org/10.1145/3308561.3354617

RELATED WORK
The emergence of technologies such as 3D printing has enabled the production of bespoke 3D materials. They provide a way for accessible materials to be produced at a lower cost and be easily distributed. With the addition of low-cost electronics, they also have the ability to be augmented with more interactivity. Museums have long produced touchable alternate representations of works, but it is typically very cost prohibitive. As a consequence, cultural institutions are expressing strong interest in the use of digital scanning and fabrication methods such as 3D printing, e.g. [11, 10, 12], at times augmented with other components to facilitate additional audio context [1].

In a recent survey of sighted museum visitors [13], most agreed that being able to handle 3D printed replicas would enhance their experience. There are also a number of case studies aimed at professionals in the sector that describe how particular institutions have made part of their collection accessible to blind or low vision visitors, e.g. [4, 8, 5].

METHODOLOGY

Gathering User Requirements and Feedback
Work began with consultation with BAG staff about their requirements. User requirements and feedback were then gathered in three stages. In stage 1, prototype materials were presented to vision impaired adults attending a regular Day Centre program at Vision Australia in Bendigo. Three sessions were conducted with a total of 39 participants and two or three artworks per session, where tactile and visual representations were shared with the participants. Preferences and comments were noted. In stage 2, a workshop was held at BAG with 13 people representing at least one (but often more) stakeholder group: local residents, artists, educators, BAG staff or volunteers, and people who were blind or had low vision. During the workshop we presented two artworks with accessible versions and discussed how a further two artworks in the gallery might be made accessible. In stage 3, we presented artworks using the three accessibility modes suggested in the previous workshop: onsite with a gallery guide (four participants); online for remote access (four participants); and onsite with an iPad for self-guided tours (one participant).

Creation of Accessible Artworks
The accessible versions of artworks were created by an experienced accessible formats transcriber, and in accordance with accessibility guidelines, e.g. [2, 3, 6].

PROTOTYPE ACCESSIBLE ARTWORKS

In total, we created accessible solutions for 17 artworks. Of these, *Circe* and *The Drover* are meaningful examples worthy of closer examination.

Circe

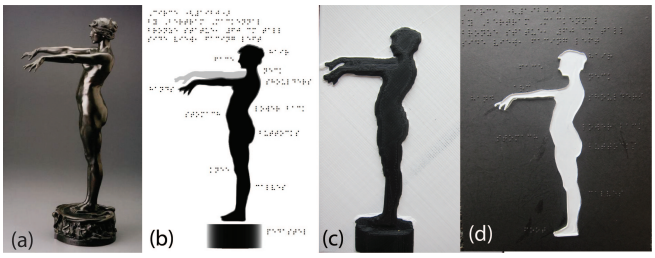

Figure 1. (a) *Circe* by Bertram Mackennal (b) tactile graphic (c) 3D printed bas-relief (d) laser cut version. ©Collection Bendigo Art Gallery.

Circe (c1920) by Bertram Mackennal is a bronze statuette the Greek mythological sorceress, standing naked on a pedestal with snakes in her hair. It measures 60.7 x 22.2 x 23.1cm.

The most obvious accessibility measure for a sculpture is touch access to the artwork or a 3D model. However, Circe was deemed too valuable to touch and repeated attempts to scan a 3D image, in the constraints of the formal gallery space, were unsuccessful due to the reflective properties of the smooth dark shiny surface. We considered using an artist's mannequin in the correct pose, however it did not convey any of the more meaningful aspects of the sculpture. Instead, a side profile was created as a tactile graphic on microcapsule paper, a 3D printed bas-relief, and laser cut acrylic on card (Figure 1). All three accessible formats used high contrast between the figure and background for use with low or residual vision.

The accessible formats were presented to participants in stage 1 along with a verbal description by an experienced gallery guide. It was noted that the guide adjusted the description as they became more familiar with their audience. By the last session, they talked much more about how the sculpture feels and what features could be noticed in the accessible versions.

Of the 22 blind or vision impaired people who inspected the accessible versions of *Circe*, the preferred format was the laser cut version (n=11), followed by the 3D printed bas-relief (n=8), print (n=2) or a combination of all formats (n=1). The tactile graphic was not favoured by anyone. The laser cut version was mainly appreciated for its smooth texture, which was thought to best correspond with the original sculpture. The appeal of the 3D printed bas-relief was perhaps its higher relief, as it was reported as easier to feel. There was much discussion about Circe's figure (some of it quite cheeky!), indicating that participants had been able to understand and interpret the artwork and gained enjoyment from the experience.

The Drover

The Drover (1912) is an oil on canvas painting by Walter Withers (Figure 2a). It measures 100 x 124cm and is displayed in its original ornate wooden frame.

Figure 2. (a) *The Drover* by Walter Withers (b) enlarged enhanced image (c) 3D printed bas-relief. ©Collection Bendigo Art Gallery.

A simplified version of *The Drover* was produced as a tactile graphic on microcapsule paper and 3D printed bas-relief (Figure 2c), depicting the rider on horse, dog, sheep bodies and tree trunks. We also produced a version of *The Drover* using the GraVVITAS system [7] with a print and tactile overlay. This gives an overview description and audio labels as the finger touches various components in the image.

These formats were provided as part of a guided tour in stage 3 of the research. The tour also included a discussion of the artwork by a BAG staff member. Touch access was provided to a hat similar to that worn by the drover, unwashed sheep's wool with a strong scent, and a wooden frame similar to the original. The participants were clearly engaged in the tour, asking questions about the specific artwork, but also stimulating discussion about art in general, such as how the paintings are hung and significance of different types of brushstrokes.

For the accessible website for remote access or self-guided tour, the original painting was shown in high resolution along with close-up of the drover on his horse with faded background to increase contrast. Descriptive text gave artwork specifications, a description of what could be seen including brushstrokes and palette, information about the artist, and background about the subject matter. A soundscape played automatically with the sound of sheep, drover's whistle and a dog barking. A second audio track played discussions from the guided tour recorded in the gallery. *The Drover* was named one of the most engaging pages as it highlighted interesting issues around visual representation. While the soundscape was enjoyed both at the tour and on the website, it was unexpected and users said that they would prefer that it not be played automatically. Formal evaluation of how the full suite of representations complement each other is still to be conducted.

CONCLUSIONS

This work adds to existing guidelines on art accessibility for vision impaired people by examining a mix of traditional methods, new technologies, and the importance of mixed representations and modalities. Stakeholder consultation confirmed that it is a good idea to present more than one format and more than one presentation mode to suit the diverse needs and preferences of potential gallery visitors. New technology therefore offers value alongside more tradition methods such as description. 2.5D tactile graphics are less useful than more dimensional formats such as laser cutting and 3D printing.

ACKNOWLEDGMENTS

Our thanks are extended to the Bendigo Art Gallery and the research participants.

REFERENCES

[1] Giorgos Anagnostakis, Michalis Antoniou, Elena Kardamitsi, Thodoris Sachinidis, Panayiotis Koutsabasis, Modestos Stavrakis, Spyros Vosinakis, and Dimitris Zissis. 2016. Accessible museum collections for the visually impaired: Combining tactile exploration, audio descriptions and mobile gestures. In *Proceedings of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI) Adjunct*. ACM, 1021–1025.

[2] Elisabeth Salzhauer Axel, Virginia Hooper, Teresa Kardoulias, Sarah Stephenson Keyes, and Francesca Rosenberg). 1996. ABS's Guidelines for Verbal Description. (1996). http://www.artbeyondsight.org/handbook/acs-guidelines.shtml.

[3] Braille Authority of North America. 2010. *Guidelines and Standards for Tactile Graphics*. The Braille Authority of North America. http://www.brailleauthority.org/tg/web-manual/index.html

[4] Fondation de France/International Council of Museums. 1991. *Museums Without Barriers: A New Deal for Disabled People*. Routledge.

[5] Harriet Dunn. 2018. Comment from the field: Facilitating art access for people with visual impairment. *Journal of Literary & Cultural Disability Studies* 12, 2 (2018), 245–247.

[6] Gillian Gale (Ed.). 2005. *Guidelines on Conveying Visual Information*. Round Table on Information Access for People with Print Disabilities Inc. Available from http://printdisability.org/guidelines/guidelines-on-conveying-visual-information-2005/.

[7] Cagatay Goncu and Kimbal George Marriott. 2011. GraVVITAS: Generic multi-touch presentation of accessible graphics. In *Proc. IFIP TC Int. Conf. on Human-Computer-Interaction*.

[8] Gretchen Henrich, Felice Q Cleveland, and Emily Wolverton. 2014. Case studies from three museums in Art Beyond Sight's multi-site museum accessibility study. *Museums & Social Issues* 9, 2 (2014), 124–143.

[9] Leona Holloway, Kim Marriott, Matthew Butler, and Alan Borning. 2019. Making Sense of Art: Access for Gallery Visitors with Vision Impairments. In *Proc. CHI Conference on Human Factors in Computing Systems*.

[10] Moritz Neumüller, Andreas Reichinger, Florian Rist, and Christian Kern. 2014. 3D printing for cultural heritage: Preservation, accessibility, research and education. In *3D Research Challenges in Cultural Heritage*. Springer, 119–134.

[11] Roberto Scopigno, Paolo Cignoni, Nico Pietroni, Marco Callieri, and Matteo Dellepiane. 2014. Digital fabrication technologies for cultural heritage (STAR). In *GCH '14 Proceedings of the Eurographics Workshop on Graphics and Cultural Heritage*. 75–85.

[12] Roberto Scopigno, Paolo Cignoni, Nico Pietroni, Marco Callieri, and Matteo Dellepiane. 2017. Digital fabrication techniques for cultural heritage: A survey. In *Computer Graphics Forum*, Vol. 36. Wiley Online Library, 6–21.

[13] Paul F. Wilson, Janet Stott, Jason M. Warnett, Alex Attridge, M. Paul Smith, and Mark A. Williams. 2017. Evaluation of touchable 3D-printed replicas in museums. *Curator: The Museum Journal* 60, 4 (2017), 445–465.