Redefining gender identities on campus

The Focus

Vietnam and Korea in the longue durée
Negotiating tributary and colonial positions

Digital Buddhology
Buddhist studies in the digital age are faced with immense opportunities, challenges, and problems both old and new. By using the word ‘Buddhology’, we encourage readers to think of not only text-based Buddhist studies but a cross-disciplinary field where art, architecture, and material culture are an integral part of the term in question.

In this issue’s ‘China Connections’, we invite readers to look at the exciting development of digital Buddhology in present-day China. Highlighted here are recent digitization projects by Peking University, Zhejiang University, and the research institutes at the world heritage sites of Dunhuang, Yungang, Longmen, and Dazu, some involving international collaborations such as with the Getty Center and Harvard University.

Conservators, researchers, curators, and educators from around the world work toward the common aim of preserving Buddhist cultural heritage – texts, images, objects, monuments, and sites – by exploring and adopting, all the while pushing the forefront of digital technologies. Contributors of this issue demonstrate how Buddhist canonical work and manuscripts in multiple languages and media have been made available through open-access online databases; how Buddhist monasteries and their ancient wooden buildings and century-old murals are recorded and experienced through virtual reality; and how rock-cut cave temples with their monumental statues are captured using laser-scanning or photogrammetry and reconstructed for conservation as well as education purposes. The benefits of the application of digital tools are immediate, certain, and manifold: they make quick and precise documentation, allow (in some instances) for a greater accessibility to and searchability of Buddhist materials, and provide excellent research and educational materials. The very practice of digitization forces us to reconsider the very meaning and significance of the ‘cultural heritage’ itself. Concerns have been made as to how much a digitally recorded or reconstructed piece of work can be considered an extension to that heritage and the protection thereof, while much of the ‘aura’ of the original has been lost during the process of digitization. On the other hand, some have advocated for the ‘digital life’ or ‘digital afterlife’ of Buddhist art and architecture, as Buddhist practitioners actively engage themselves with all kinds of digital tools and platforms in their religious routines. We hope that you find some answers, but more importantly further questions, from the five essays presented in the following.

Digital Buddology

Wu-Wei Chen

When discussing heritage conservation, authenticity is the guideline of the process. To maintain the original status of the heritage, paying attention to details and reversibility helps to prevent further damage to the cultural properties when applying materials or methods. Contemporary conservators embrace digital technologies such as photogrammetry, laser scanning, CT (MR), Infrared, and X-ray scanning in the process. These technologies provide non-intrusive monitoring to collect and share data. The data further helps to analyze the status of the material within and enables the establishment of visualizations and replicas as references. In some cases, replicas further become part of the heritage object after restoration or even replace the original cultural object.

In China, the restoration of the Thousand-Armed Bodhisattva Guan Yin, which is part of the Chongqing Dazu Rock Carvings, showcases the usage of 3D printing for heritage conservation. The 3D printed model, made in 1:3 proportion to the original, became the reference for the restoration team during the process. Some 3D-printed parts were also blended with the authentic heritage item (Fig. 1).

Projection mapping, along with restoration, can be further utilized in creating engaging narratives and messages for cultural heritage.using a special 360-degree dome shader. It was a year-long process to merge the 2D photographs and merge them into the 3D geometry for the entire cave. Collaborating with the Getty Conservation Institute on the narrative, VR has created a “fluid experience” in the physical environment other than the heritage site. In this case, projection mapping, along with VR, stimulates public interest in and core for cultural restoration. It also reveals the fluidity of digital heritage across cultures, regions, and identities. Even with the collective devotion, cultural heritage continues to face the threat of human activities ranging from vandalism to theft and wars. Education is key to raising and cultivating the awareness of preservation. With the joint efforts of academia, governmental organizations and industry, the finalized projects can be transformed into education materials. Digital storytelling, computer-aided drawing, and cyber-archiving can be integrated into the STEAM curriculum (Science, Technology, Engineering, Arts, and Mathematics) to help students comprehend the invaluable values of heritage (method, techniques, context) and further cherish the existing yet endangered tangible cultural properties.

Good practices of conservation, from cultural objects to architecture and the entire heritage sites, can be further revitalized by digital narrative and storytelling. The latest animation released by the Dunhuang Academy was inspired by the digitized painting in Cave 255. Mr. Chen Haitao and Mrs. Chen Qin, the directors of the animation, integrated the rich imagery of the Buddhist stories of ‘The Great Departure’ and ‘The Attack of Mara’ from the Mogao Cave 259 into animated infographics (Fig. 2). Their interpretation of the cave painting and artistic recreation has given the piece more profound meanings. The follow-up premiere and workshops at Beijing in late 2016 further revitalized the original painting and contributed to public and higher education.

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Center for Global Asia at NYU Shanghai

The Center for Global Asia at NYU Shanghai serves as the hub within the NYU Global Network University system to promote the study of Asian interactions and comparisons, both historical and contemporaneous. The overall objective is to connect Eastern and Western academic societies with information on the contexts for the reemerging connections between the various parts of Asia through research and teaching. Collaborating with institutions across the world, the Center seeks to play a bridging role between existing Asian studies knowledge sites. It will take the lead in drawing connections and comparisons between the existing fields of Asian studies, and stimulating new ways of understanding Asia in a globalized world.

Asia Research Center at Fudan University

Founded in March 2002, the Asia Research Center at Fudan University (ARC-FDU) is one of the achievements of the cooperation of Fudan and the Korean Foundation for Advanced Studies (KFAS). Through the years, the center is making all the efforts to promote Asian Studies, including hosting conferences and supporting research projects. ARC-FDU keeps close connections with the JAPCS in mainland China and many institutes abroad.

Fig. 1: Restoration of the Thousand-armed Bodhisattva Guan Yin in progress. Image courtesy 3dren.org

Fig. 2: Animation film directed by Chen Haitao and Chen Qin. Image courtesy Dunhuang Academy.

Guest Editor

Di Luo
Kaihuasi: Buddhist art and virtual reality

Jianwei Zhang and Lala Zuo

The Kaihuasi (開化寺) is a Buddhist monastery located about 17 km northeast of the city of Gaoping (高平) in southeast Shanxi province. The monastery was established in the 6th century and expanded in the late 9th to early 10th century under the supervision of the Chan Master Daoyu (大愚). The Kaihuasi is especially known for its main hall, the Daxiongbaodian (大雄寶殿) [Mahavira Hall], which was built in 1073 during the Northern Song. The interior of the Daxiongbaodian is decorated with exquisite Buddhist mural paintings that have been preserved from the 11th century.

In 2017, a research team of the Experimental Teaching Center for Virtual Reality and Simulation in Archaeology at Peking University used Virtual Reality (VR) technology to record the monastery including the main hall and its murals. First, the team deployed drones to take pictures of the monastery complex from an aerial view. Then panoramic photography was used to record both the interior and exterior of each building (fig. 1). In order to virtually reconstruct the building structure and mural paintings in the Daxiongbaodian, the team took 480 high-resolution photographs and used photogrammetry to create a 3D model of the Daxiongbaodian (interior) with surface texture and color information. In other words, the photos were applied as skins to precisely cover the surface of the 3D model of the building’s interior (fig. 2). After all data was collected, the team located all buildings on a map using the Geographic Information System (GIS). The links to the panoramic photographs were pinpointed on the aerial picture according to the real locations where the photos had been taken. The links to the 3D models with surface texture were also displayed on the map. Aside from documentation, this VR project has also been applied to enhance the experience of museum visitors. In the spring of 2017, the Arthur M. Sackler Museum of Art and Archaeology at Peking University exhibited high-resolution virtual copies of the wall paintings from the Kaihuasi. In addition to viewing the paintings in two dimensions, visitors were able to wear a VR headset and immerse themselves in the virtual scene of the Daxiongbaodian to appreciate the paintings and the building in their original spatial context. VR would help museums to redesign and upgrade traditional exhibitions, and to protect historical architecture from potential damages made by flocking visitors.

Using the VR technology to document art and architecture is only the team’s first step. The benefits and challenges of the application of VR and other digital technologies will be further discussed in a panel titled ‘Digital Humanities and New Directions in Studying East Asian Art and Architecture’ at the 2018 Annual Conference of the Association for Asian Studies (AAS), to take place in Washington D.C. this March. The panel, organized by Professor Jianwei Zhang and Lala Zuo, will present more original digital humanities projects and explore new directions in East Asian art and architectural history.

Fig. 1: Panoramic photograph of the Daxiongbaodian at Kaihuasi (built in 1092). Photo by Yunan Wu.

Fig. 2: Steps of creating the 3D model of Daxiongbaodian (interior). Photos by Yunan Wu.
(a) Point cloud image generated by photogrammetry.
(b) Triangle mesh model converted from the point cloud image.
(c) Triangle mesh model with surface texture and color information.
(d) Anaglyph of Daxiongbaodian, its 3D effect viewed by wearing 3D red cyan glasses.

Notes
2. The VR-Heritage is a database developed by Peking University in 2017. It aims to record important cultural heritage sites with panoramic photography, oblique images, 3D modeling, and other VR technologies. It is currently under construction and will be accessible for academic use in 2 or 3 years.

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Longmen Grottoes: New Perspectives
Fletcher John Coleman

O n 25-26 October 2017, Harvard University welcomed a team of experts from the Longmen Grottoes Research Academy to present an influential joint-initiative focused on digital conservation and restoration. An enduring legacy to Chinese art, the UNESCO World Heritage Site of the Longmen Grottoes represents over a millennium of religious and creative activity. The ‘Longmen Grottoes: New Perspectives’ workshop brought together Longmen Grottoes Research Academy researchers with specialists on Buddhist art from across the globe to promote cutting-edge efforts at digital preservation, archaeological work, and documentary projects taking place at Longmen.

Spearheaded by Eugene Wang, Abby Aldrich Rockefeller Professor of Asian Art at Harvard University, and Hou Xuke, Director of the Material and Information Center at the Longmen Grottoes Research Academy, the two-day workshop was centered on overviews of recent digital programs at Longmen. Tasked with addressing centuries of damage and dispersal of the magnificent limestone grotto sculptures, the Longmen Grottoes Research Academy began a comprehensive digital program 3-D scanning project over a decade ago. Having built an extensive database of cave images with the 3-D Academy, uses the information to conduct new efforts at preservation— including the redressing of grounds according to the reallocations. The precision of the digital data has also driven exciting new archaeological discoveries of the eastern cave district at Longmen.

With technological efforts reaching a mature phase of seven years, the Research Academy has turned its attention to the digital restoration of sculpture removed from the caves during the early 20th century. The ‘Longmen Grottoes: New Perspectives’ workshop represented the inaugural partnering of Harvard University and the Metropolitan Museum of Art with the Longmen Grottoes Research Academy to begin a 3-D digital scanning project of all known Longmen sculptures housed in institutions around the world. As data is collected, the caves will be digitally recreated and an enhancement of virtual and augmented reality technologies. Algorithms are used to match fragmentary pieces with their original cave locations, allowing for the accurate virtual recreation of the sculptures to their original forms. Workshop participants were able to explore the Longmen Grottoes’ most recent sample cave restorations through a virtual reality experience. The Academy plans to build a site museum of digital restorations, as well as an immersive travelling exhibition.

Workshop participants were also treated to presentations on exciting new academic research being conducted on the Longmen Grottoes. Ranging from explorations of female sculptures housed in institutions around the world. As data is collected, the caves will be digitally recreated and an enhancement of virtual and augmented reality technologies. Algorithms are used to match fragmentary pieces with their original cave locations, allowing for the accurate virtual recreation of the sculptures to their original forms. Workshop participants were able to explore the Longmen Grottoes’ most recent sample cave restorations through a virtual reality experience. The Academy plans to build a site museum of digital restorations, as well as an immersive travelling exhibition.

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Digitization projects at the Cultural Heritage Research Institute, Zhejiang University

Zhirong Li and Changyu Diao

The team at the Cultural Heritage Research Institute of Zhejiang University embarked on a series of major digitization projects in 2010. Headed by an archaeologist and a scholar in image processing, our members come from various disciplines including computer science, archaeology, art history, and digital humanities. Our mission is to establish a high-standard, comprehensive digital database of the cultural relics in China for the purpose of conservation, research and education.

At present, the team has conducted digitization work at more than a hundred archaeological sites, museums, and cultural institutions across twenty different provinces, cities, and autonomous regions in China. Our work encompasses large-scale monuments such as historic architecture and Buddhist cave temples, and museum collections ranging from textiles to paintings, calligraphy, porcelains, and statues. We aim to maintain state-of-the-art technological standards in the process of scanning, archiving, preserving, and presenting cultural objects and sites.

Recently, with the collaboration of the Yuyang Academy, we have successfully printed a to-scale 3D model of the rear chamber of Yungang Cave 3. This marks a significant advance in the digital conservation and reconstruction of cultural heritage in China.

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