"I Went to America to See Ancient Italian Paintings": The Problem of the Re-contextualization of Artworks Uprooted from Their Original Settings

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Abstract. The paper aims to explore new methods of re-contextualization of artworks in their original settings, based on 3D reconstruction and 3D Web, through a case-study. It concerns a cycle of Medieval frescoes, detached from the walls of a monastery in Umbria, Central Italy, altered by numerous and some very recent renovations. At the present, the fragments of the cycle of frescoes are preserved in various museums, mostly in the United States.

Keywords: Italian Medieval frescoes · American museums · 3D reconstruction 3DWeb · Digital Heritage

1 Introduction

"Sono andato in America per conoscere molte antiche pitture italiane": the important Italian art historian Lionello Venturi wrote these words in his introduction to two volumes, titled *Pitture italiane in America*, published by Ulrico Hoepli Editore in Milan in 1931, and dedicated to many artworks from Italy that ended up across the ocean. At the enthusiasm he discovered, unexpectedly but happily, of the love for Italian art demonstrated by American collectors, Venturi also discovered many questions about the "plucked flowers" and the problem of the de-contextualization of artworks uprooted from their original settings and sold on the art market, which, on the one hand, had increased the phenomenon of collecting and connoisseurship, and on the other, had led, in many cases, to the loss of any sense of the provenance of the works themselves, all now exhibited in museums [1]. Historical research attempted, over the course of the last decades, to close some of the gaps created between artworks and their provenance, often enabling a complete sense of the original context, which new 3D technology allows us to visualize, going well beyond written description or simple graphic recreation, leaving future generations with an effective memory of culturally

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complex systems, now fragmented and no longer accessible, while the interaction between the Humanities and Digital Heritage continues to solicit deeper reflections and new knowledge.

This paper presents the results of a multi-disciplinary project linking Humanities to Digital technologies (started from a preliminary survey of artworks uprooted from Medieval religious buildings in Central Italy [2]), that aimed to virtually piece together a dispersed cultural heritage, restoring its overall physiognomy by putting it into its historic and historic-artistic context and by creating suitable traditional and multi-media tools, which enables the works of art to be enjoyed as though they were still all together in the same place, in their original layout

2 The Frescoes of the Monastery of S. Maria Inter Angelos

The cycle of frescoes of the Clarissan monastery of St. Maria inter Angelos, called Le Palazze, located very close to Spoleto, in Umbria, Central Italy, was created by an anonymous Maestro, which we call the "Maestro delle Palazze". It is of such high quality that another important Italian art historian, Roberto Longhi, described it as "la splendida serie duecentesca", whereas other critics referred to individual parts of it as "outstanding examples of thirteenth century Italian art".

In the 1920s, the majority of the frescoes were removed and purchased by American collectors, and now are preserved in five museums on the East coast of the United States [3]: the Museum of Fine Arts in Boston (MA), the Glencairn Museum in Bryn Athin (near Philadelphia-PA), the Fogg Art Museum at Harvard University in Cambridge (MA), the Wadsworth Atheneum Museum of Art at Hartford (CT), and the Worcester Art Museum at Worcester (MA).

The technique employed to remove the frescoes, known as *lo strappo*, that is the removal of only the upper surface of paint, made possible to remove, many years later, also the second layer still visible on the walls of the monastery. In 1964, in fact, these 'second detachments' of the five frescoes earlier detached, and one of the frescoes not yet detached, were removed from the walls, and are now exhibited in the National Museum of the Duchy of Spoleto, with other two scenes found in another room, on the lower level of the monastery, representing the *Enthroned Madonna and Child with Saints Clare and Francis*, and the *Crucifixion* [4].

In the end, the bond between text and context was lost forever. We are not just talking about a physical de-contextualization, meaning the separation of the frescoes from the architecture and, as a consequence, the musealization (an operation often very useful, since it makes the works of art better preserved), but also about a cultural de-contextualization, meanings a fragmentation (the cycle is not united anymore), and a dispersion in places far from the original place. Since we all agree that every work of art should be understood in its context, with our project we intended to recreate the original context for these fragments.

Today nothing remains on the walls, save a few small, evanescent traces of the frescoes. We don't even have any written evidence about the monastery at the time when the frescoes were painted, and the only description of the cycle before the removal of the frescoes, written by Raimond van Marle [5], is vague. Fortunately, we

have a few historical photographs of the monastery before the 'second detachments' were detached, and, of course, we have the frescoes.

As we said, the frescoes were originally painted in two different rooms of the monastery, on two levels, one above the other. The most interesting room is certainly the upper room (see Fig. 1).

Fig. 1. Monastery of St. Maria Inter Angelos, upper room, eastward, and its 3D reconstruction (on the right).

In the upper room, the frescoes represent stories about the Virgin and the Passion of Christ. The sequence began on the south wall, moving eastward, which now reveals only infinitesimal signs of plaster and pigments. Based on a historic photograph taken when the room was used as a hayloft and before the second detachment was removed, we can virtually restore, with certainty, the two scenes on the east portion of the south wall: the *Annunciation*, to the right, and the *Nativity*, to the left. The virtual reconstruction of the scene of the *Nativity* is based on the photograph found by Francis Henry Taylor in the file cards of the Worcester Museum, which he published in 1932 [6]. The image was taken when the fresco was still *in situ*, and thus prior to its removal and subdivision into various parts, only a few of which have survived to this day and are now in four different American museums. The black and white image, virtually repositioned on the wall, was used as a base for the application of color reproductions of the fragments that survived the subdivision of the image by the antiques market. This scene of the *Nativity* contains also the representation of the *Adoration of the Magi*. The position of the Magi appears designed to create a sort of continuity with the adjacent wall, a condition often found in wall paintings from the Byzantine world. Unfortunately, no traces remain of the portion to the right of the east wall. Maybe this area was once covered by an *Enthroned Virgin and Child*, with the Magi kneeling before them.

The narrative continued on the north wall, where the traces of the pigments are more evident. This wall was occupied, to the left, by *The Last Supper*, and, to the right, by the *Derision of Christ* (the scene in the room detached later respect to the other scenes). The narrative ended with the *Crucifixion*, in the left part of the eastern wall. In the room there were other two frescoes, that seem "independent" from the cycle we just mentioned: on the left, a *Crucifixion*, on the right, *The Second Coming*, maybe painted later, after the earthquake occurred in 1298 at Spoleto. This event and anxieties about

the turn of the century, in other words trepidation about the coming of the end of the world and the imminent arrival of the Day of Judgment, at a time when calamities were considered punishment for human errors, offers a plausible explanation for these two scenes. What's more, here, for the first time in an eschatological context, we find a depiction of the *Mater omnium*, the very first representation of this iconography. This monumental figure, whose accentuated verticality evokes the bell tower of a church or town hall, welcomes the entire community beneath her mantle. The intermediary between sinners and a judging God, here the Virgin Mary is also to be seen as a bulwark against calamities and natural disasters [7].

For the study of the frescoes at Le Palazze, based largely on traditional methodologies, the use of digital technologies proved fundamental, since they consented a 360° exploration of space and a vision from different points of view, raising new questions and subsequent new intuitions and stimulating continuous attempts to express the indissoluble nexus between the frescoes and their place of origin. Above all they permitted a reunification – ideal, to be sure – of the fragments distributed in different museums. This dream was caressed during the past century by the directors of the Glencairn Museum and the Worcester Art Museum when, within their possibilities, the one attempted to purchase the fragments of frescoes from Le Palazze held by the other.

3 3D Spaces for Cultural Environments

Virtual environments are widely recognised as great opportunities in Cultural Heritage for research and communication [8–11] and 3DWeb is their natural ally. A fruitful tool for Cultural Heritage on-line outputs has been achieved in the past thanks to, for example, Multi User Virtual Words for cultural and educational aims [12, 13] and, at present, there are some considerations about merging virtual worlds and 3DWeb [14]. 3DWeb is a very simple solution for users: no specific applications to be downloaded, no plug-in to be installed, just a common recent browser and an average device are needed. In an approach aiming at developing the audience for Cultural Heritage contents, the Web option can be considered as the most viable and effective one and 3D environments have received a significant help by 3D Web.

VisitLab Cineca is engaged since the late Nineties in the development of Digital Heritage applications and deployed its first 3D environment online as part of the "Certosa Virtual Museum in Bologna" project in 2004 [15]. At the time, the virtual versions of two existing monuments, dedicated one to the Bolognese dead soldiers of the Great War and the other to the partisans fallen during the liberation war of the World War II, were created for a semi immersive stereoscopic fruition in Cineca Virtual Theatre. Thanks to a proprietary plug-in, called Exhibit 3D, the two virtual environments were delivered for a desktop and an online navigation and linked to a large database about the people and the events commemorated by these two monuments and their related ossuaries. However, the Exhibit 3D plug-in not only required an installation, in order for the 3D environment to be navigated, but also implied a licence to be paid, reasons why these 3D applications were, at some point, discontinued.

In recent years VisitLab tested some open source 3D players, such as X3DOM and Blender Game Engine [16], landing, in the end on Blend4Web (https://www.blend4web.com), an Open Source framework well integrated with the software Blender (https://www.blender.org/), used at the Lab as the main 3D modelling software since 2010. Blend4Web framework has been mainly used in order to achieve the online visualisation in projects such as Terrae Motus (https://hpc-forge.cineca.it/files/visit_reggiacaserta/public/demo_01/terremotus/terremotus.html) [17] or MUVI - Museum of Daily Life in 20th century Italy (http://muvi.cineca.it/) [18]. In those projects the applications were delivered for online fruition and, in both cases, along with a cardboard version, developed as an offline application. The final HTML file was created in a non automatic way matching the JSON + BIN export from Blender, the Javascript used for creating the interactions, the CSS file and Uranium.js for the physics. We will see in paragraph 4 why in the "Le Palazze" project a comprehensive HTML file was preferred instead.

4 The 3D Application for "Le Palazze"

The 3D reconstruction of the upper room of the monastery has been performed using Photoscan (http://www.agisoft.com/), starting from a photographic campaign suitable for photogrammetric reconstructions, and refined in Blender (www.blender.org). The room, used at present as a conference room and furnished with easily movable pliable chairs, enabled a straightforward acquisition campaign (see Fig. 1). The lower room, on the contrary, is now in use as a warehouse, preventing therefore a photogrammetric reconstruction and forcing a 3D modelling directly in Blender (see Fig. 2).

Fig. 2. Monastery of St. Maria Inter Angelos, lower room, eastward, and its virtual reconstruction (on the right).

After the setting of the photos of the frescoes dispersed among the different museums, the real-time navigation of the virtual environments has been implemented in Blend4Web (www.blend4web.com).

Blend4Web is a framework that, thanks to the integration of WebGL libraries inside the latest browsers, enables visualisation and interaction with 3D environments exported from Blender. Blend4Web does not need a plug-in and is programmable in JavaScript. For the application developed for the present project no JavaScript was used, preferring a direct export from Blender to the Web through the add-on in Blend4Web. This same add-on makes available in Blender logic nodes, that can be used managing the camera movements inside the scene (Fig. 3). In any case, by using Blender API's and JavaScript it is possible to create more complex movements and interactions.

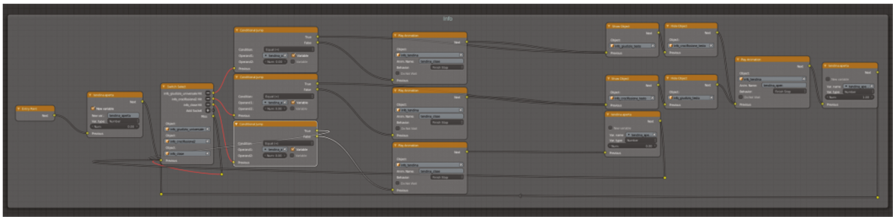

Fig. 3. Blender: node tree created to trigger the information panel by clicking on the info icons.

For the development of the app two nodes sufficed: "switch select" and "move camera". The first one, that consents to track the selection of an object in the scene, holds a list of clickable objects, that is, for both rooms, a series of tiles on the floor. With "move camera", instead, when an object is selected with the mouse, the node moves the camera by using two fictitious objects functioning as "destination" and "look at". "Destination" gives the point of arrival of the movement; "look at" directs the view of the camera.

The mesh was simplified in order to optimise the high-poly photogrammetric 3D model for a real-time navigation. The process was implemented in Blender thanks to a retopologizing of the high-poly mesh towards a low-poly model, with a number of polygons low enough to enable a smooth navigation inside the virtual reconstruction.

Further on, the transfer of the color information coming from the textures of the high-poly model was performed in Blender with the bake to textures technique. The technique needs a precise superimposition of the two models (high and low poly), the creation of a UV mapping by unwrapping the model, a source texture - from which to copy the information, and a destination canvas texture, where to copy the new colour information on the low-poly model.

5 A Simple 3D Web Application for an Off-Line Distribution

As before said, for the final publishing the 3D application was exported as a single comprehensive HTML file including geometries, the scene, the logics of the user's interactions and the libraries of the framework. As an all-in-one application it can be easily distributed. In our case this led also to the possibility of linking the application to

other HTML pages through simple links: a 2D HTML page introduces the applications, explains the navigation modalities and enables the access to the two 3D reconstructed environments at Le Palazze - the main hall and the lower chapel, prepared as two comprehensive HTML files. The Blend4Web solution with the HTML export enables the user to visualise the application on whatever recent browser without the need of installing anything on its own device. Furthermore, by choosing Blend4Web, it is possible to rely upon very good final performances on mobile devices, on a wide selection of possible interactions inside the virtual world, a very good physics engine and an excellent reliability [19].

The navigation solution adopted for Le Palazze, user friendly in its simplified interface, was selected in order to be easily used by art historians, the preferred audience of the publication, and other researchers in humanities, that are not yet too versed in navigating virtual environments. Therefore, instead of a point and click system, a simplified version with hot spots was preferred. The movement is possible among large squared areas on the floor and is further helped by a minimap with an orthogonal view of the squares on a side of the window.

A JSON + BIN export would have enabled wider customisation options and more complex interactions. In our case, however, the main aim, that foresaw letting the viewer perceive the space and the relocated works of art in their pristine setting, was achieved with a more simple and slender solution.

6 Conclusions

The 3D reconstruction, based on the data collected through traditional historical research focused on various aspects (iconographic, stylistic, technical), finally shows the frescoes in their original settings, trying to help the scholars to understand the purpose of the complex original decorative program, until now pretty confused.

The 3D reconstruction will also have a certain impact on the use of the monastery as a monument, now stripped of the images that once completed it, and on the images themselves, the frescoes preserved in the museums, far from the monument to which they once belonged, both finally reunited.

The next step foresees the analysis of feedbacks of the users and the virtual restoration of the frescoes.

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