The Past Re-Presented: Anthropological Perspectives on Digital 3D Figure Reconstructions in Peru

Christiane Clados

Introduction

Peru is a country rich in culture, from the ancient pre-Chavín cultures, to last but not least the Inca, whose material legacies shape the image of this country inside and out. As early as Max Uhle's 1895 excavations in Pachacamac, there has been great interest in the scientific analysis of these important cultures, which continues today. Given the rich cultural heritage, it is not a surprise that the reconstruction of the archaeological evidence also has a long tradition in Peru. It is common to produce recreations in museums and archaeological parks that show visitors what monumental architecture or ancient people looked like in the past. In recent years, there is an increasing use of digital 3D reconstructions, also called virtual reconstructions, to visualize archaeological data, which has made both the material and immaterial cultural heritage of prehispanic Peru widely accessible. Beyond the scientific data they attract international attention and play a social and political role. Three case studies illustrate how the recreation of individuals in form of digital 3D figure reconstructions serve not only as visualizations[1] of scientific data, but also as a way for Peruvians to identify with their own history.

3D Reconstructions, Figure Reconstructions, and Forensic Facial Reconstructions in a Digital Environment

The use of digital 3D reconstructions[2] for visualizing data has been recognized in the scientific community since the 2009 London Charter[3] and

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1 I use the term according to Marcos Llobera (2011) who defines "visualization" as the mapping (transformation) of data or any sort of information into a representation that can be perceived.

2 Authors like Reynolds (1981, 173) also call them "reconstitutions" and "recreations".

3 http://www.londoncharter.org.

the 2011 Seville Principles.[4] Digital 3D reconstructions can be described as "[…] the process of capturing the shape and appearance of real objects". Like reconstruction drawings and three-dimensional life-sized models, they are particularly powerful as visual summaries or descriptions that allow large amounts of complex information to be rapidly assimilated (Reilly 1992). By "translating" scientific data, they contribute to a better understanding of certain aspects of cultural heritage and help to make complex scientific data accessible to the public. The broad user community includes experts from fields such as architecture, archaeology, art history, palaeontology, forensic anthropology, and museology. In order to transfer the object into virtual space, image acquisition is done either with a laser scanner or using digital photogrammetry. Both methods serve the purpose of documentation on one hand, and on the other can serve as a basis and reference for analysis. A third method is manual modeling, which refers to the creation of polygon models using 3D modeling software (Clados 2020a and b).

Digital 3D figure reconstructions of (pre-)historical individuals represent a subgroup of digital 3D reconstructions and are a relatively late development in this field. Their roots lie in the traditional reconstruction of historical figures based on archaeological and ethnographical finds, such as those used for museum displays. With the advancement in 3D technology, this process is increasingly performed digitally. Computerized 3D forensic facial reconstructions, often a substantial part of digital 3D figure reconstruction, have their origin in the first facial reconstructions of Wilhelm His (Gupta *et al*. 2015) and Michail M. Gerasimov (1971). In this method, the operator uses 3D computerized models adding muscles and skin on the skull in order to obtain the image of an individual for his/her recognition and identification.

History of Scientific Reconstructions in Peru

One of the precursors of present-day digital 3D figure reconstructions in Peru is the representation of Inca rulers, like the images of "Sapa Incas" on large genealogy panels called *biombos* or *paños* (Phipps 2004). These originated in the eighteenth century after many Latin American countries gained political independence from the European countries (Alvarado 2020). The new dominant classes tried to expropriate the indigenous past as national

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4   http://sevilleprinciples.com/.

heritage (Jansen 1988, 87) and commissioned genealogical series in which they were visualized as legitimate successors of Inca rulers. Shortly after independence, new governmental institutions, intellectuals, and publicists started considering pre-Columbian material culture as national patrimony (Riviale 2015, 92-98). The increasing number of excavations and the constructions of museums resulted in two forms of hypothetical reconstructions, two-dimensional illustrations and three-dimensional scale models (dioramas), including three-dimensional life-sized models frequently displayed in Peruvian museums. Such mannequins have long been a medium in museums of several countries to visualize ancient dress, ornaments, and weaponry, like, for example, the famous Red Cloud stereograph mannequin (Scherer 2009, 86-88) or the Kwakiutl Hamatsa group created under the curatorship of Franz Boas, both at the Smithsonian Institution. In Peru, Julio C. Tello and Toribio Mejia Xesspe (1979) published a life-sized model dressed with the textiles found at the Paracas Necropolis.[5] Similar mannequins can still be found in Lima in the Museo Nacional de Arqueología, Antropología e Historia del Perú, the Museo Tumbas Reales de Sipán, Lambayeque, and the Museo Nacional Sicán, Lambayeque (Figure 1). The other type of reconstruction uses drawings and sometimes even appear with the mannequins in diorama-like arrangements. Both media serve to visualize the original context of the archaeological objects and to explain their functions to visitors. Some pictorial reconstructions like the ones in the "Sala Nasca" of the Museo Nacional de Arqueología, Antropología e Historia del Perú no longer exist (Figures 2a-b).

Three Case Studies

The following three case studies enjoyed a great deal of international attention. Most information is based on newspaper articles, which provide detailed information on the production process and how the reconstructions were received by the international press.

Lord of Sipán

In 1987 Walter Alva started work at the site of Sipán, discovering one of the largest finds in the history of Peru: Burial 1, or the Royal Tomb of the Lord of Sipán ("Señor de Sipán") (AD 420-665, AD 435-665) (Figure

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5   To be seen on the cover of the book "Paracas Segunda Parte: Cavernas y Necropolis", 1979.

3). National Geographic supported the scientific excavation for over four years. After the documentation and restoration of the excavated objects, a non-digital 3D reconstruction of the Lord of Sipán was created and exhibited in the Brüning Museum. In 2016, a Brazilian NGO Team of Forensic Anthropology and Odontology started working on reconstructing the face of the Lord of Sipán, using digital 3D techniques normally employed to solve crimes. 3D computer graphics designer Cicero Moraes and forensic dentist Dr. Paulo Miamoto used computer software to reconstruct the Lord of Sipán's skull, which had been severely damaged by the weight of his burial. The skull was in 96 pieces when it was found, and technicians had glued it together and pinned a plastic frame inside the skull. Moraes created the 3D image by using digital photogrammetry. He imported the images into a computer and rebuilt the skull digitally by piecing the digital fragments together and filling in the missing parts in gray (Figure 4). Algorithms in Blender, an open-sourced graphics program, enabled Moraes to apply layers of muscle and skin in appropriate thicknesses according to the structure of the skull. Features such as skin tone were based on those of local Peruvians. Finally, Moraes created digital images of other artifacts that were found with the mummy to recreate a fully adorned image of the ruler (Figure 5). According to Walter Alva the reproduction closely resembles the earliest known Moche portrait vessels (Scott 2016).

Figure 1. Burial 1, Lord of Sipán. 1999, © C. Clados.

Figure 2. Digital 3D facial reconstruction, workflow, Lord of Sipán. Cicero Moraes, December 10, 2018. https://commons.wikimedia.org/wiki/File:Se%C3%B1or_de_S%C3%ADpan_-_Reconstrucci%C3%B3n_Facial_Forense_(pasos).jpg (October 14, 2023).

Figure 3. Digital 3D facial reconstruction, Lord of Sipán. Cicero Moraes, December 10, 2018, https://commons.wikimedia.org/wiki/File:Se%C3%B1or_de_S%C3%ADpan_-_Reconstrucci%C3%B3n_Facial_Forense_-_cropped.jpg (October 14, 2023).

Lady of Cao

In 2005, archaeologists uncovered a mummy bundle at the site of El Brujo on the north coast of Peru containing a young woman from the Moche culture dating to about AD 400. Excavations began at the site in 1990 under the direction of Régulo Franco Jordán, supported by the Augusto N. Wiese Foundation. Using digital 3D techniques, experts have recreated the woman's face to give visitors a better look at the original appearance of the woman called Lady of Cao ("Señora de Cao") (Figure 6). Advised by physical anthropologists, forensic scientists and engineers specialized in 3D technology created as faithful a reproduction of the woman's face as 3D animation softwares would allow. Archaeologist Arabel Fernández López, who oversaw these efforts, emphasized the role of 3D reconstruction as a vehicle to "keep this extraordinary discovery alive for many generations to come" (Williams 2017). To offer an idea of what the noblewoman looked like, investigators first had to produce digital images of the mummy, which were taken with hand-held laser scanners. The face of the woman was fleshed out on the computer so that only the bones of the skull remained. Joe Mullins, a forensic artist for the US National Center for Missing & Exploited Children and consultant for the project, described the process as similar to a traditional Manchester Method (Gupta *et al*. 2015, 27), adding facial tissue pegs or markers, but rolled into the digital environment. The entire head was printed in 3D, and a model for a museum display was then created in fiberglass (Williams 2017). To make the Moche woman fully come to life, she was dressed with clothing and ornaments that were found in her grave.

Huarmey Queen

In 2012, archaeologists Milosz Giersz and Roberto Pimentel Nita of the University of Warsaw discovered a tomb of the Wari culture (AD 550-1000) at El Castillo de Huarmey. Here too, the National Geographic Society funded the excavation. The tomb contained the remains of 58 women. One of these women, nicknamed the Huarmey Queen, was found in a small chamber close to the ruler's throne chamber and was surrounded with precious grave goods (Greshko 2017). The reconstruction of her face started in the spring of 2017 in cooperation with Oscar Nilsson, a Swed-

ish sculptor and archaeologist who specializes in reconstructing faces. Unlike the reconstruction of the Lord of Sipán and the Lady of Cao–both of which were done almost entirely with computers–Nilsson took a hybrid approach for the Wari noblewoman. Using a 3D printed model of the woman's skull as his base, Nilsson rebuilt her facial features by hand (Greshko 2017).

Figure 4. 3D-print, Lady of Cao, "Sala 7", Museo Cao, La Libertad. Ozesama, September 10, 2018. https://commons.wikimedia.org/wiki/File:Museo_Cao.jpg (October 14, 2023).

International Reception

All three case studies have received a great deal of attention in the press at home and abroad, with the Lord of Sipán receiving by far the greatest interest of all. The latter was not only discussed in numerous articles in *El Comercio* and *National Geographic* but was the subject of various journals and reports. It is striking that the significance of the archaeological evidence is emphasized by referring to facial reconstructions of other important individuals in world history. On November 21, 2016, *El Commercio* wrote: "La recreación del rostro del Señor de Sipán, el mayor soberano de la cultura prehispánica Mochica, desveló hoy la apariencia que tuvo el primer gran gobernante que se conoce del antiguo Perú, cuya figura es comparada con el faraón egipcio Tutankamón por su fastuosa tumba" (*El Comercio* 2016). The September 2016 online report of *3DPrint* commented as well that: "[…] Meanwhile, Moraes continued […] using the same kinds of techniques that have been used to reconstruct the ancient faces of everyone from an unknown Egyptian woman to Jesus Christ" (Scott 2016). The facial reconstruction of Lady of Cao also drew commentary in the *National Geographic* volume of July 4, 2017 that "[i]n similar cases, such as King Tut and Ötzi the Iceman, bodies have been scanned with a stationary medical CT machine" (Williams 2017). When the grave goods of Sipán were shown in an exhibition in Moscow, the newspaper *El Comercio* headlines on November 17, 2017, read: "Walter Alva presentará en Rusia al 'Tutankamón americano'" (*El Comercio* 2017b).

Overall, it is noticeable that the number of digital facial reconstructions is limited. This may be due to the high costs involved, but also to the fact that the technology is offered by experts outside Peru. A significant reason for choosing to create a facial reconstruction is the possibility of printing a virtual model to circulate in museums, exhibitions, and websites. 3D prints give the organizers the opportunity to display the different sets of regalia found in the tombs, an exhibition practice which recalls the Red Cloud mannequins dressed in different costumes (Scherer 2009, 86-87).

Realistic Style and Identity

One reason for using digital 3D technologies is the fact that they are normally employed to solve crimes, which implies an accuracy that excludes any artistic interpretations. Without doubting the accuracy of the models,

they also are used because of the positive reputation of 3D reconstructive techniques to represent "truth" due to their sophisticated technologies. Here, the application of digital 3D techniques brings to mind the positive reputation the first photographs had in the early twentieth century (Müller 2009). Thus, the technical component of computerized 3D reconstruction plays a significant role in the construction of history: a guarantee of the exact reconstruction of an individual's face as a vehicle to connect people directly to the past. However, the use of technology frequently belies the fact that the final product is often manually reworked: "If you consider the first step to be more scientific, I gradually come into a more artistic process, where I need to add something of a human expression or spark of life", says Nilsson. "Otherwise, it'd look very much like a mannequin" (Greshko 2017) In many cases, as in the recent reconstruction done by Adrie and Alfons Kennis, the reconstruction is partly or completely manual.

From the very beginning, Peruvian museums have had their own exhibition aesthetics, many of them with the focus on a "realistic look". When digital 3D reconstructions make use of a realistic style, they do so to mimic natural perception; an effect intended to support viewer recognition of the object and viewer-object interaction. In the case of a YouTube video showing the reconstruction of the Lord of Sipán, the realistic look has led to very emotional statements like "Un gusto conocerlo, Señor de Sipán :)", "Hermoso nuestro Señor De Sipán!", and "now it's the time to know the face of Lady of Cao" (*Agencia de Noticias Andina* 2016). Whether realistic reconstructions should be applied carefully (Reilly 1992), with indication of the hypothetical parts of the reconstruction (Clados and Messemer 2021; Messemer and Clados 2020), or to support an immersive, real-world environment (Chandler *et al.* 2015) is not to be decided in this chapter, but follows the lessons learned that the archaeological evidence alone is not identical to the original appearance (Niccolucci 2007, 21) and needs to be visually "translated" (Clados 2020a, 113; Clados 2020b, 155). No doubt, a reconstruction is an interpretation of the archaeological evidence. However, the archaeological evidence was already interpreted by the archaeologist (Hodder 1993, 256) long before interpretation by the reconstructor was undertaken; it is an interpretation of the interpretation that takes place.

Another reason for the use of a realistic look as part of an immersive experience is obvious. In the case of the noblewoman of El Castillo de Huarmey, Nilsson used photographs of indigenous Andeans and even real hair from an elderly Andean woman living nearby because chemical data

suggest that the Huarmey Queen grew up drinking the local water, high-lighting the connection between ancient and recent populations. In the case of the Lady of Cao, the locals have embraced her as one of their own, often representing her in civic events and school activities.

> We want people of all ages to have a unique, memorable experience that con-nects them with the Señora of Cao. People are very proud of her. She turns up in discussions about the indigenous community's cultural identity and has become an icon of Peruvian womanhood

says Fernández López (Williams 2017). To the people of northern Peru, biological anthropologist John Verano says the 3D reconstruction is "[…] undeniable proof that this distinguished, powerful woman from long ago looked just like them. I think it's going to be particularly important for children. Looking into her eyes, they'll be able to see their own relatives from town, and their own ancestry. It's something that a mummified face just can't give you (Williams 2017)". Likewise, in the case of the Lord of Sipán, *El Comercio* comments on November 4, 2017:

> Combining cutting edge technology with the results of forensic anthropo-logical and anatomical research made it possible that we now have a quite realistic picture of how the famous Moche leader would have looked like: he had the typical features of pre-Columbian ancestry and looked like the original South American indigenous Indians that lived in the area hundreds of years ago.[6]

And Walter Alva noted: "The reconstruction of the features of the Lord of Sipán and the forensic anthropological analysis has allowed us to get closer to the face of our ancestors (Scott 2016)". And it is not just indigenous communities who have started to identify with the prehispanic individuals brought to life using 3D reconstructions. In 2017, Verónica Linares im-personated the Señora de Cao in the first edition of *América Noticias*, lin-king a powerful woman from the past to a present one (*El Comercio* 2017a).

Also noteworthy is that the lifelike effect of some mannequins is em-phasized by moveable arms and accompanying sounds. In this respect, these models reflect aesthetics, which can also be seen in the frequently performed re-enactments, be it for tourists, festivals (Figure 7), or in ritual contexts (Creamer *et al.* 2021, 189-207).

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6   LimaEasy, July 1, 2021, https://www.limaeasy.com/multimedia-videos-books/vid-eos-clips-documentaries-peru/videos?m=rh66Y (May 4, 2022).

Figure 5. "Sapa Inca" and "Coya", Re-enactment, Plaza de Armas, Casma. 1995. © C. Clados.

Digital 3D Reconstruction as Interpretation: Who Owns the History

Although all three reconstructions provide a platform of identification for local and indigenous groups, it should be noted that participation in the scientific process by Quechua, Aymara, Asháninka, and other Peruvian indigenous groups is nonexistent or very low. Comparing these to the production of *biombos* of the 18th century, it is important to note that the latter were often made by Quechua artists (Phipps 2004) and thus incorporated much more of an indigenous voice than 21st century digital 3D reconstructions of prehispanic individuals. While indigenous knowledge is certainly incorporated in the form of ethnographic data, it makes a difference whether the producers are Quechua, Aymara, or Ashaninka knowledge specialists, who could incorporate their own specific ontologies (Duarte and Belarde-Lewis 2015) directly into digital 3D reconstruction, or not. Also, regarding the constitution of knowledge, the role of funding organizations such as National Geographic needs to be considered. Without a doubt National Geographic helps to sponsor numerous research projects and provide a great deal of information on some of the most intriguing facets of the world. But with its focus on the unknown, fasci-

nating and entertaining, it may unconsciously contribute to the fact that the data interpretation is adapted to these requirements.

Conclusion

Apart from the significant scientific value and the need to translate scientific data via visualizations, all three digital 3D reconstructions provide much more than the visual translation of scientific results. They reveal the social practices associated with the scientific process and are by analogy of Bourdieu's (1972) theory culturally inculcated and performed as *habitus*. The analysis shows that the production of digital 3D reconstructions is largely in the hands of people who have access to digital technologies; that is, who can finance them as well as have the training to create them. In the case of the digital 3D reconstructions of the Lord of Sipán, the Lady of Cao, and the Huarmey Queen, the artists are from Sweden, Brazil, and the United States. While there is an increasing tendency to include indigenous knowledge in the interpretation of the archaeological record, they are, so far, not involved in the making of the digital 3D reconstruction. It seems that awarding of the contracts is a matter of external representation, intended to signal that the best available technology should be used for individuals as important as King Tut and Ötzi the Iceman. The exceptional technologies stress the importance of the archaeological findings, and at the same time make the digital 3D reconstruction a status symbol. Although there is now an overall trend to reconstruct individuals who attract less international attention in the development of historical 3D figures, as seen in the non-digital works of Kennis and Kennis, in Peru there is still a strong tendency to reconstruct individuals with international reputation.

Worldviews are inscribed in these examples of digital 3D reconstructions, of both the producers and the perceivers. Archaeologists in Peru, as well as those who look at the reconstructions in museums, in daily newspapers, and on the Internet, perceive them as their ancestors, regardless of their ethnicity. Reconstructions thus possess an integrative power similar to that of the "biombos" and go far beyond the function of a scientific product. The integrative power is proportional to the degree of the realistic look, which was an important goal of visualization in all three examples. In this way, these examples join a long tradition of very effective display technologies in Peruvian museums and their particular aesthetics.

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