

# Digitising Heritage or reconstructing Imagination

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**Abstract** *To advance the theme of digital conservation of **heritage** and tie it to museums, we report on two case studies of digitising archaeological sites; the first is the remaining of a Scottish Crannog which dates back to 600 BC., and the second is a UNESCO protected site in the Middle East (the desert castle of Qusayr Amra, Jordan), which dates back to early 8th century. Then we relate both to our investigation into **embodiment, interaction** and metaphor in **virtual environments**.*

**Human Communicative and none-communicative practices** Archaeological artefacts have a wide functional context. Hence, their interpretation, and therefore conservation, is a matter of meticulous representation of abstract communicative and non-communicative practices.

The process of abstraction – of interpretatively considering an object independently of its associations, or its plurality of supposedly merit-equivalent attributes – can and should be offset by the process of representation, which is viewing objects within their larger contexts. After all, archaeological artefacts, inevitably have a setting upon which their actual value is critically dependent. This contextual setting projects beyond the artefact’s realm in comprising both processes (design) and products (actual artefact) relating to human action in relevant regards. In particular, it encompasses both communicative and non-communicative practices including the processes, procedures, and methods in relation to spatio-temporal styles of life and the products of non-communicative processes and practices (embodiment). If we understand the ways and means of people’s mode of being-in-the-world, we will understand their spaces.

The salient point that has to be urged against conservation’s hermeneutical objectivity is not that every reality is virtual. The archaeological artefacts are not closed because they concern themselves with the real world. They can and do bear on non-communicative pro-

cesses and interactions with environments of a non-spatial realm. There are not only ancient ruins, but also inhabitants and everyday life that could be reconstructed in virtual environments. When Husserl’s opinion concerning judgment is deployed in our argument, a tentative claim is in order. Husserl, drawing on the concept that “The free construction of forms knows as yet no restraining contradictions” (1969, 70), which links objects to their attributes outwith any limitations, is trying to establish objects as the repository of fundamental forms of what he labels as Conscious abstraction (1969, 70). Objects manifest these abstractions in space and time. In view of this manifestation, a speculation that one of the most fundamental abstractions, the body interaction, is a frequent abstraction of the human condition or embodiment reflected in these artefacts, can be made.

In order to communicate the memory of space and human social and cultural condition, architects as well as archaeologists, are using various technologies like Virtual Environments (VE) as a form of representation in order to simulate existing archaeological artefacts or even non-existing ones that otherwise cannot be experienced in Real Environments (RE). Departing from the assumption that archaeological spaces act as a repository of meaning and memory through embodied interaction, and by asserting that ‘VE is a metaphor of RE’, this paper suggests that ‘the meaning and memories of RE can be conserved and simulated in VE’. Challenging the notion that sees people reacting to VE in the same way as



they interact with their surroundings in RE, we propose that since memories of space engulf any archaeological artefacts, they are also present and simulated in the corresponding VE.

**Digitising memories** In order to examine this hypothesis, we extend the metaphor to consider two case studies - the first is the remaining of a Scottish Crannog Fig 1 which dates back to 600 BC., and the second is a UNESCO protected site in the Middle East Fig 2 (the desert castle of Qusayr Amra, Jordan), which dates back to early 8th century – by constructing corresponding VEs and making them available for navigation and simple interactions. While the first artefact is non-existent, the second one is still preserved and in a very good condition. The first was digitally reconstructed in the form of a 3D model using available data gathered by the researcher. The 3D software Autodesk Maya was used to construct the model, apply textures and materials, animate possible patterns of corrosion and finally make available as a VE.

The second, which is already well documented, was digitally reconstructed using available data. However, the textures and materials were documented by a visit to the actual site. Autodesk “3DStudio Max” was used in reconstructing this 3D model, and making it available as a VE.

Both 3D models are made available as Shock-wave 3D environments that work with concepts of movement, interaction and navigation. It is possible to create different interactions and bodily experiences using visual stimuli as a tool to evoke reactions. We have extended this perceptual metaphor with the intention of representing a visual realm that induces hyper perception, and evoking reactive spatial emotions.

Each environment is projected onto four screens of a cubical space, thus creating a 360 degree virtual immersive environment Fig 3. The projected visual realm allows users to interact directly with their VE drawing on the power of metaphorical association between the image and human scale and embodiment. Users’ movement in the cubicle is communicated to the computer using a gyration device that depicts their body movement



Figure 1 Left a Scottish Crannog.



Figure 2. Qusayr Amra

in space. The data is sent to two sets, each comprises a pc with two graphic cards, and two data projectors. A special script, then, translates data into movement in the VE causing it to instantaneously change the display projected onto each set. Another special script running on both computers ensures that the four screens are forming 360 degrees, thus creating a visual stimulus that is similar to the real.

Users are asked to use this installation, then a qualitative method of research follows to probe their experience, focusing on issues related to meaning of space. Subjects are asked to give a personal account of their experience, which give us an insight into how they think.





Figure 3. The cubical space showing the VE of Qusayr Amra (Photo taken from south/west)

Previous experiment established familiarity through the similarity between the real and the virtual environment, and then we recorded the natural action of the subject in the real environment and asked the subjects to perform the same action in the virtual environment and measure the virtual action to the scale of the real action (Al-Attili and Koutsoumpos, 2006). This experiment establishes human body and scale as the source of similarity in human condition, therefore, familiarity.

If the goal is to understand any kind of users' responses in the simulated space, then creating virtual interaction according to the physical one, or identifying the limitation of this system's capabilities, therefore its ability to reflect feelings and impressions would be of a little use.

Focusing on the general common themes emerging from participants' engagement with the simulation, or the following interviews, is more of use as it is meaningful to the users of the VE (Spagnolli et al., 2003). A qualitative method of research followed to probe their experience. Subjects were asked to give a personal account of their experience through a questionnaire and semi-structured interviews which gave us an insight into how they think.

**Methodology** Phenomenology is defined traditionally as the study of objects as they reveal themselves to us. The success of phenomenology stems from the fact that it grants each individual a personal account of experience, and, ultimately, applies the process of phenomenological reduction to establish general facts

about human experience. Although well established beyond doubt as the study of objects and how they reveal themselves to us, a different construal of the elements implicated in this definition, may highlight phenomenology as the study of the foundation of human experience from the first person. Phenomenology, particularly within the digital paradigm, is well informed by an extensive body of theoretical and experimental literature in the field of embodiment in relation to virtual environments.

Research within cyberspace and VE is generally approached using 'subjective' and 'objective' methods. Some of the techniques used in the 'subjective' methods include self-evaluations produced by subjects in the form of questionnaires (Singer and Witmer, 1999; Lombard and Ditton, 2000), collecting self-reported breakdowns (Slater and Steed, 2000), comments and interviews; or, as in ethics, narratives constructed similar to self-reports (Dibbell, 1998).

While deploying McLuhan's consideration: "media are extensions of the senses" (1966), Biocca (1997) argues that a developed interface of embodiment that is increasingly "natural" could result in different adaptations or changes in the user, thus highlighting the capabilities of this environment as an interactive tool of embodiment. Slater and Usoh (1994), however, emphasise perceptual spatial character of these environments, and the role of human body as an object within this spatial virtual environment.

They also extend their argument in an attempt to explore the spatio-temporal possibilities of the duality of body-avatar.





Figure 4. Two subjects interacting with the VE with the device concealed

## Experiment and Techniques

Building on the early experiments and many that were developed later, the researcher opted to subject users to the first VE while wearing a belt that contains and conceals the gyration device. This ensured that users were not aware of the immediate connection between their bodies and the installation. For the second VE, the device was revealed and users were instructed to hold it and direct it with their hands in order to cause the required visual effect. In each instance, users were asked to explore the VE as if it was a normal space, and explore the way in which they need to use the device in order to explore space. The decision of simplifying the task came to allow more concentration on verbalising thoughts and direct experience meaningfully as we will explain later.

The main subjective measures used in collecting data in this experiment are qualitative techniques and questionnaires. The first consisted of two parts: Think Aloud during the actual experiment, and semi-structured interview afterward, while the later was in the form of a post-test questionnaire.

**Think aloud** Think aloud technique is also called verbal report on thinking or concurrent verbalisation. Although well established in psychological research, the first to introduce this technique computer science in 1972 were Newell and Simon in their book: *Human Problem Solving*. This was to help them model the sequence of human thoughts while solving a problem (1972). Later, Lewis and Rieman elaborated on this technique in their book: *Task-Centered User Interface Design: A Practical*

*Introduction* (1993). The technique was used by Neale et al. (2001), Spagnolli et al. (2003), Turner P. et al. (2003), and Turner S. et al. (2003). The basic instruction is very simple: “Tell me what you are thinking about as you work.”<sup>1</sup> The technique provides qualitative subjective data that represent the concurrent process of thinking as a reaction to stimuli which observers to eliminate any misconceptions that might affect the outcome of the experiment, and also helps subjects achieve intentionality as they are doing an action and describing it.

**Post-test questionnaire** Questionnaires are the most popular measure of collecting data since they can reflect different aspects of human experience and keep the consistency, thus allowing comparison against. Although Jex (1979) could be identified as the person to classify different experiments as one item, and then subcategorise them, Sheridan (1979) was the person who moved the techniques into VE. We proposed a questionnaire that rates subjects’ perception of VE, interaction with VE, level of reality of VE, Level of engagement with VE and meaning of space.

**Conclusion** The familiar event is rendered strange in this encounter as we see familiar objects projected. As we encounter something foreign, we draw on the strength of the metaphoric relations between image and space in order to make sense of our environment. When G, one of the subjects, was asked to get out he said: “To go out!!! Out of here or out of the Crannog?”

The interaction with this specific VE draws on the power of metaphorical association between human virtual space and human old space, and in both cases human embodiment is the connection. G makes a remark while in the installation: “The physical body movement that I am doing right now is very different. So every movement of my body would make a difference.” D, another subject, express similar opinion: “I am kind of calibrating myself a little bit. Sort of what effects my movements are having on the screens”.

This project highlights issues of familiarity, interaction, augmentation, the virtual, narrative and metaphor.



A phenomenological understanding of such interventions helps to develop an understanding of digitally conserved or reconstructed artefacts. The emotional level of the responses decides the degree of users' awareness of the meaning of the space.

The familiar event of walking around in a space is rendered strange, and consequently gives us a new understanding of the spaces other inhabited. A subject commented on this strange feeling of being in the centre of interaction: "It feels like the four screens around are watching you somehow. I do not know why. You keep on turning around at four screens at once to see what is happening around, but you cannot see all four together simultaneously." The next challenge is to examine multi-user interaction in the same space, to see how such experiences are negotiated collectively, and through digitally-mediated communications.

Beyond the presentation of the experiment a number of other issues were raised during our experiment, but cannot be expanded in the limited space of this paper: the understanding of the task as a game. A subject commented on his experience: "it is like playing with my whatever game console", while another said: "In some ways I am like in a game where I am not given clues, and if you do stand around twiddling your thumbs, something at some point will prompt you to move or chase you".

Other issues were the intentionality of interaction using technology as a medium, as opposed to the use of one's body, the spatiality of one's interaction, the connection between the attention to navigation, and the loss of meaning embedded in VE; and ultimately the dilemma of virtuality.

However, we realise the limitations of this experiment since it is still far from providing a formal testing procedure. For example, in its current form, the experiment fails to address issues related to the presence of the other in the VE even through spatial experience, the creation of the emotional load in the delivery of the instructions in the VE.

Nevertheless, the results and their evaluation shows startling possibilities, further establishing

VE as an arena for investigating issues pertaining to both archaeology and human embodiment.

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**Keywords:** *Virtual Environments, Embodiment, Representation, Interaction, Heritage*

