WHAT IF? WHAT NEXT?

SPECULATIONS ON HISTORY'S FUTURES

SESSION 1C

MODES OF ARCHITECTURAL HISTORY

Architectural History in the Digital, Virtual and Gaming Age/Space

'TRIENNALE VIRTUALE': NEW MODES OF ARCHITECTURAL HISTORY THROUGH VR EXPERIENCES OF EPHEMERAL ARCHITECTURE

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The 'Triennale Virtuale' project explores one of the myriad ways that our knowledge of past times, places and cultures can be accessed, understood and disseminated. It creates virtual reality experiences of lost architecture from the Milan Triennale exhibitions of the 1930s. This project proposes a new mode of architectural history experience by taking us along a new route to the past via multiple perspectives involving architectural history, digital heritage and user experience.

The paper deals with two case studies: Studio BBPR's Saturday House for the Newly Weds *(1933), a fullscale prototype of modern housing built for the* Housing Exhibition, *and Giuseppe Pagano's,* Exhibition of Serial Production *(1940) which showcased newly developed industrial products made possible by economic reform and regime investment in industry.*

Due to the impossibility of a live exhibition utilising VR headsets during COVID-19 lockdown, the models were made available online accompanied by introductory videos. Our research team conducted mixed-methods research exploring questions of authenticity of experience and its value in helping to understand history and architecture. Online questionnaires and interviews revealed how people interpreted and reconstructed these designs through their desktop virtual reality experience. We wanted to explore the sense of presence with respect to how people engaged with the models in terms of the design content, gaining knowledge about the past and the relationship that they created around the time, place and culture that the pavilion and exhibition design embody.

These constructed virtual landscapes present the value of the past to an audience that goes beyond the academic journal/conference and the university classroom and poses new questions about the relationships between history, memory and narrative within architectural history.

Introduction

Traditionally, architectural history had occupied the academic realms of books, journal articles and conferences where scholars gather to delight over the latest archival discovery or connection between Building X and Architect Y that had not occurred to anyone else this far. From the heady days of the Grand Tour, to Corbusier's journey to the East, and Aino and Alvar Aalto's honeymoon to Italy it is well known that a physical experience is key to understanding architecture. When buildings are designed to be ephemeral, as is the case for most exhibition pavilions that are not as iconic as Mies's Barcelona pavilion, the only way they can be experienced is through virtual reality reconstructions. At the other end of the spectrum, with the aid of the plethora of information, communication and emerging technologies that support new user experiences, gamers can dodge sabre-wielding foes by ducking down a tiny alley in Renaissance Florence or tune into the latest podcast on why everyone hates Brutalism whilst starting a *soffritto* in the company of a nice Shiraz. But what if there was a space somewhere in between that combined rigorous scholarship, immersive experience and engaging narrative? The *Triennale Virtuale* project explores how our knowledge of past times, places and cultures can be accessed, understood and disseminated by creating self-guided virtual reality experiences of lost architecture accompanied by an engaging introductory background with further resources to find out more.

Alternative Mode of Architectural History Experience

This project proposes a new mode of architectural history experience that traces a route to the past via multiple perspectives: architectural history, digital heritage and user experience. Because of their temporary nature, pavilions are often the most innovative architecture of their time but they are lost opportunities for embodied and experiential learning because they cannot be visited.[1]

Emerging technologies that support user experience of an alternate, virtual and in this case historical reality are becoming more accessible and more affordable to the average household. This opens up the opportunity of new experiences that can be had without even leaving home. Not only can we simultaneously travel to places hundreds and thousands of miles away from our current location, we can visit and participate in fictional worlds created for the gaming context, or, as in the case of this project, experience walking through an architectural space that no longer physically exists to learn more about it. Our research contributes to understanding around how important the fidelity of the rendering of the virtual world is to the user experience of architectural history. This includes how the user interacts with that world, how they move through the space, and how they perceive it with respect to their senses. The user experience of a system needs to be both easy to use and enjoyable to ensure that people continue to engage with it. Both researchers and students of architectural history gain a more three-dimensional understanding of such ephemeral works as those of the Milan Triennale than they would by merely reading texts, analysing drawings and black and white photographs.

User experience in virtual reality is a growing area in human-computer interaction research and has previously focussed on the gaming genre of VR to learn about human perceptions and experience of virtual environments. However, the use of VR for learning and training requires much more investigation. The key aspects that impact on the quality of the user experience in virtual worlds are immersion, presence, flow, and fidelity. Immersion involves the user's deep mental involvement when engaging with the system and includes the extent to which computer displays deliver an inclusive, extensive, and surrounding illusion of reality to a person's senses.[2] Immersion is regarded as an objective measure defined by the quality of the sensory fidelity provided by the technology.

Presence, on the other hand, is a more subjective feeling of being in one place, while physically located in another.[3] Cummings and Bailenson have called it the sense of "being there".[4] Flow, a concept defined by Csikszentmihalyi, is a state in which an individual is completely immersed in

an activity without being aware of the activity, as such, but with a deep sense of control over it.[5] When a user is in flow, they are fully immersed and engaged in the activity, and time seems to pass without them noticing. Finally, fidelity refers to the extent to which the virtual environment emulates the real world.[6] Physical fidelity is the degree to which the physical simulation looks, sounds, and feels like the real thing.

Virtual heritage aims to document, disseminate and preserve cultural heritage sites and objects in digital 3D. For extant buildings, the 3D files can be based on point-cloud scans that provide accurate documentation of the building making it possible to transmit a virtual experience across the world. Buildings and exhibitions that no longer exist, such as the *Saturday House for Newly Weds* and the *Exhibition of Serial Production*, require painstaking archival research to re-create the buildings in digital 3D.[7] In these cases, virtual heritage offers a lifelike glimpse into how the buildings once were, enabling researchers and tourists alike to experience what it may have been like to walk through the site. Like physical museums and historical sites, virtual heritage doubles as both entertainment and education, as well as providing value for tourism.[8] Virtual reality can entice, entertain and educate a public driven by spectacle and novelty while supporting more serious research and pedagogical aims.

This research explores the levels of immersion, presence, flow and fidelity required to provide an effective learning experience for both researchers and students and a positive user experience for all. This includes an exploration of appropriate interactional mechanisms that support architectural experience, learning, appreciation and enjoyment of virtual place. A VR experience has the potential of allowing users to "travel back in time" and have an embodied learning experience of architectural history that either no longer exists, or is physically inaccessible for reasons of, for example, preservation, geographical location relative to the learner's location, or personal safety. This is the benefit of creating virtual reality representations of ephemeral architecture. Unlike the more common curated and carefully edited flythroughs often used in digital heritage they can be experienced as a three-dimensional and embodied experience of designed space that the users themselves have some measure of control over.[9] Earlier focus groups showed that participants liked being 'forced' to learn about architecture through an immersive experience, enjoyed the freedom of choosing where to go and appreciated being given some historical context before experiencing the VR reconstructions.[10]

The Case Studies: Background Info

The inter-war period of the 20th Century in Europe was a time of much experimentation in both housing and exhibition design and Fascist Italy was no exception. Exhibitions were a fundamental element of the Fascist political agenda that turned the elite realm of fine art into events with mass appeal.[11] They were laboratories for experimentation, spurred critical debate and exerted a strong influence on modernist design.[12] In 1933 Italy's exhibition of Industrial and Decorative Arts came to Milan and soon became one of three core national exhibitions that showcased Fascism's best artistic achievements along with the International Venice Biennale and the Rome Quadriennale.[13] This makes the exhibitions and pavilions of the Milan Triennale an ideal context for virtual reality reconstruction. The case studies give users to a different range of experiences: one of a pavilion in the Parco Sempione and one of a temporary exhibition housed in a Triennale building that had to be demolished due to World War II bomb damage.

Studio BBPR's, Saturday House for Newly Weds (1933)
The Saturday House was a full-scale prototype of modern housing built for the Housing Exhibition at the 1933 Triennale. Located in the Parco Sempione, not far from the Palazzo dell'Arte, its rounded form and circular windows recalled the naval style typical of the early 1930s (Figs 1 and 2). It was promoted as a luxury weekend home comprising a bedroom, living area, maid's quarters and sun-deck. It appealed to upper class young couples to 'do their duty' by procreating on their Saturday afternoons off and plugged into Fascist propaganda messages around population growth and the overall 'improvement' of Italian society. It was chosen as a case study for virtual reconstruction both for the fame of its designers, Piero Portaluppi and the BBPR group (Banfi,

Belgiosioso, Peressutti and Rogers), and for what the theme of house could teach people about Fascist society. The Saturday House is one of their lesser-known works and, together with their Naval Companies pavilion at the Paris Expo of 1937 helps researchers and students better understand the evolution of their skills as exhibition designers that later came to fruition in their Children's Pavilion at the 1954 Milan Triennale of retrofit of the Sforza Castle Museum in 1956.
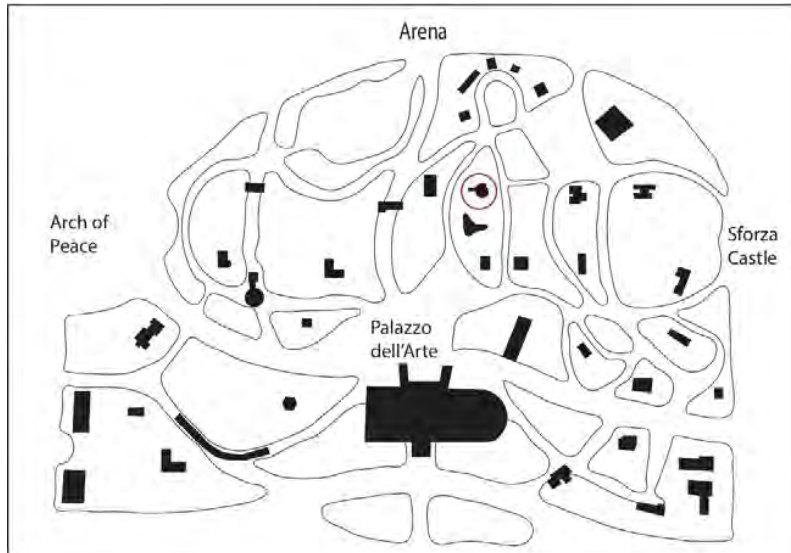

Figure 1. The Parco Sempione during the 1933 Milan Triennale showing location of the Saturday House. Drawing by F. Marcello.

Figure 2. Photographs and plans of the Saturday House for Newly-Weds by Piero Portaluppi & Studio BBPR, *Domus Triennale Special Issue* (May 1933): 410.

Giuseppe Pagano's Exhibition of Mass Production (1940)

The Exhibition of Mass Production was set up in one of main rectangular spaces of the New Pavilion, also designed by Pagano as an extension of the Palazzo dell'Arte in 1936 (Figs 3 and 4). In addition to highlighting the connection between nature and design the Exhibition showcased newly developed industrial products made possible by economic reform and regime investment in industry. As well as being the culmination of Pagano's decade-long of exploration into modern approaches to exhibition design, the Exhibition of Mass Production was a seminal moment in the establishment of Industrial design as a discipline in its own right.[14] The 1940 Triennale had another political message behind it that Italy continued to be a great industrial nation. Even with a fullblown world war on his hands Mussolini insisted that the Triennale still go ahead with a focus on industrial art and interiors available for purchase.[15]
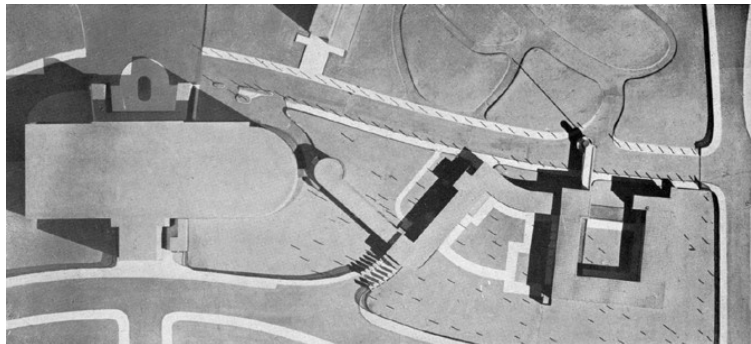
Figure 3. Giuseppe Pagano, New Pavilion, 1936 Milan Triennale. View of model showing connection to Palazzo dell'Arte. *Giuseppe Pagano Pogatschnig. Architettura e scritti*, Milan: Editoriale Domus, 43.

Figure 4. Irenio Diotallevi, Dante M. Ferrario, Francesco Marescotti, Mario Labò, Ezio Moalli, Giuseppe Pagano, Giovanni Pintori, Bruno Ravasi and Leonardo Sinisgalli, Exhibition of Serial Production, 1940 Milan Triennale. Suspended structure in circular hall and main view of exhibition. *Costruzioni*, 159–60 (March–April 1941): 4.

Measuring the Alternative Modes

We initially planned to survey and interview visitors to an exhibition on Italian design that included the two models that users could experience using a HTC Vive headset with a link to the introductory video made available via a QR code (Fig. 5). Due to current impossibility of a live exhibition context, the models and introductory videos were both made available online. The research team was still able to conduct mixed-methods research to explore questions of authenticity, veracity and experience through online questionnaires and interviews to reveal how people interpreted and reconstructed these designs through their virtual reality experience. Virtual environments on a two dimensional screen invite a different type of engagement to an immersive virtual reality experience. However, people's responses to the videos and navigation could inform future museum installation designs. Other responses based on feelings of presence (the feeling of 'being there' in another place) could be compared in future to the virtual reality exhibition to better understand the differences between the two modes of delivery.

Figure 5. HTC Vive Headset in Exhibition context. Photograph by Ian Woodcock.

Participants were asked to view information videos on YouTube about the Saturday House and the Mass Production exhibition and then invited to explore the corresponding virtual environments via an online library (Figs 6, 7 and 8). They then answered a questionnaire and some were interviewed. Although small (n=17), the sample size still allowed us to look at the variance amongst the viewers of the online video and virtual environment and then conduct interviews to explore this further.

BBPR and Piero Portaluppi, Saturday House for Newly Weds, Milan Triennale, 1933.
27 views • Jul 28, 2020

Figure 6. Flavia Marcello & Martino Eros Passi, introductory video to Saturday House for Newly Weds, 2020.
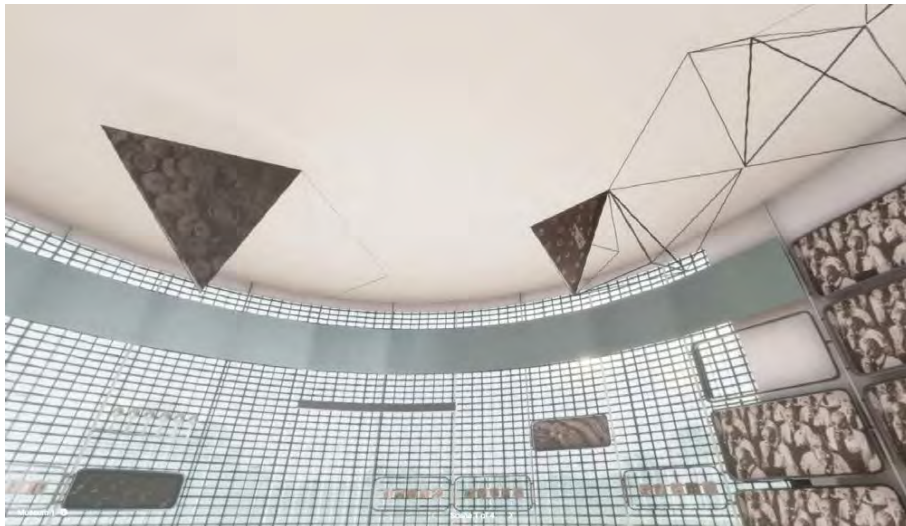
VR reconstructions by Casey Richardson, Casey Dalbo and Stephen Jeal.
Figure 7. (Above) Saturday House for Newly Weds, 2020.
Figure 8. (Below) Exhibition of Mass Production, 2020.

Participants responded to three questions about the videos using a Likert scale, where 0 is totally disagree and 100 is totally agree (see Table 1). The range of data is more evident when viewed as a box plot graph (see Graph 1).

Video questions	Median	Mean	Standard Deviation	Range	Min	Max
I enjoyed watching the video.	76	75	17	59	41	100
The video was exciting.	56	61	24	100	0	100
I learned something new in the video.	97	83	21	70	30	100

Table 1. Video questions.
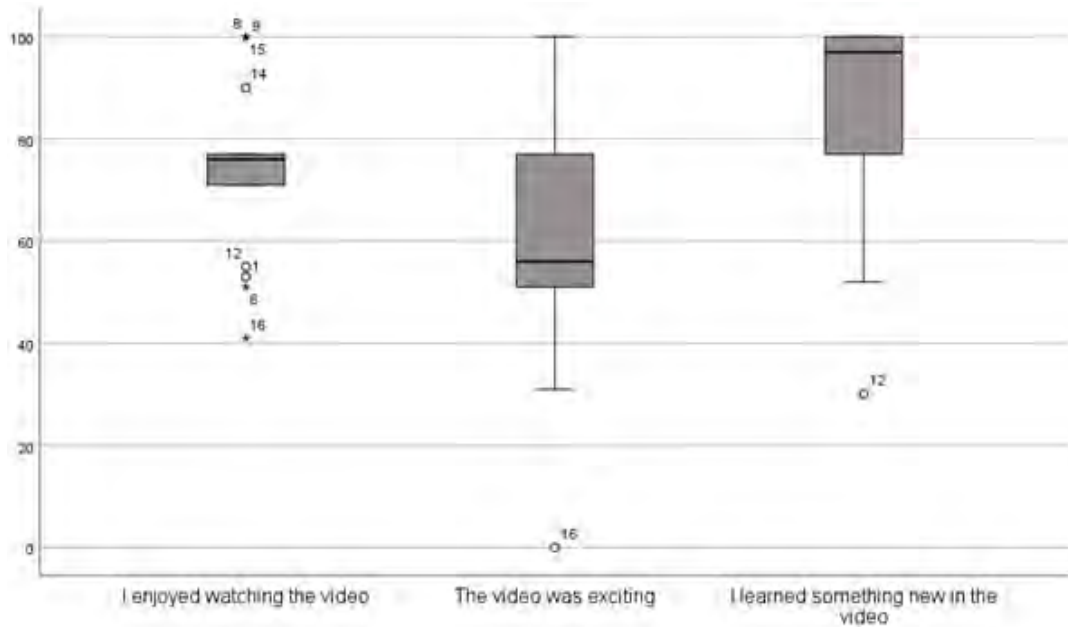
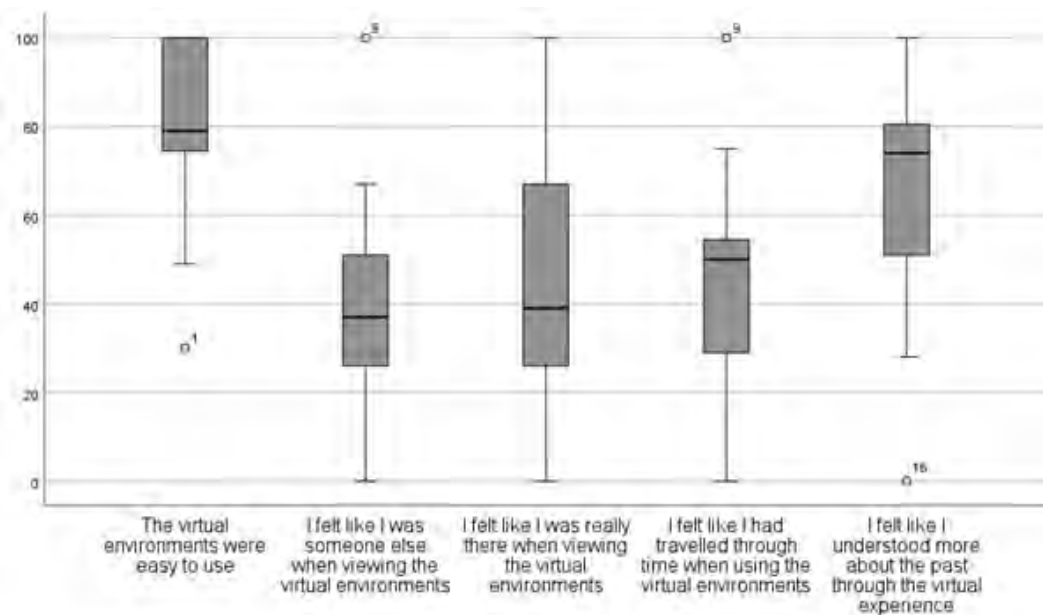**Graph 1.** Box plot of video questions.

For the most part respondents had a similar feeling of enjoyment and the response to 'I learned something new in the video' was very high, suggesting that they are an important tool in gaining understanding of architectural history through virtual reality techniques.

Questions about the Virtual Environments

Participants were also asked to respond to five questions about the virtual environments using a Likert scale, where 0 is totally disagree and 100 is totally agree (see Table 2). The range of responses can be seen in the box plot graph (Graph 2).

Virtual environment questions	Median	Mean	Standard Deviation	Range	Min	Max
The virtual environments were easy to use.	79	80	22	70	30	100
I felt like I was someone else when viewing the virtual environments.	38.5	39	25	100	0	100
I felt like I was really there when viewing the virtual environments.	39	45	27	100	0	100
I felt like I had travelled through time when using the virtual environments.	51	46	26	100	0	100
I felt like I understood more about the past through the virtual experience.	74.5	65	28	100	0	100

Table 2. Virtual environment question statistics.

Graph 2. Box plot of virtual environment responses.

The responses show that the virtual environments were both easy to use and gave a better understanding of the past thanks to the virtual experience. Questions around presence had lower median responses, with most online questionnaire participants not feeling that they were someone else, not feeling that they were 'really there', and around half feeling that they had travelled through time. This was most likely due to the fact that the virtual experience was screen-based and it is expected that scores would be higher if the spaces had been experienced using a headset as originally planned. The widest variation in the second and third quartiles was in responding to 'I felt like I was really there when viewing the virtual environments'. This question would be explored further through interviews.

Interview results

Interviews data was analysed using Interpretive Phenomenological Analysis to compare subjective experiences and find underlying meaning in the individual experience and reveal some of the causes for differences in opinion in the online questionnaire.[16] Exploring the individual experiences underlying the categories listed in Table 2 allows us to find ways to design virtual experiences that can provide more immersion for different people and, through this, learn more about the architecture of the past. The initial questionnaire revealed inconsistency in reporting presence. The interviews confirmed the wide variety of responses to self-reported states of presence, fidelity and authenticity in the environment. The three types of presence that were noted, in both the questionnaire and the interviews were the sense of 'being there', the sense of being someone else, and the sense of travelling through time.

On Being 'Really There' in the Virtual Environment

In the interviews, presence often defied identification on behalf of the participants. While participants 2 and 3 felt a strong feeling of presence, participants 1 and 6 had to explain and revise their feelings of presence on reflection of the experience, and participants 4 and 5 had no feeling of presence. The feeling of presence seems to defy cognitive thought and be purely affective in these states. Perhaps this is unavoidable as the person is asked to feel something that they may not have felt in real life, in the words of participant 3:

> *Sort of feeling like you're just having that experience of what it might actually be like being there at that time, and being sort of actually in another country or mostly being, you know, all of a sudden you're in another world.*

Different feelings of presence appeared to happen independently of each other. Although participants did not feel like another person (except participant 3 who may have felt that way through his out-of-body experience), two felt like they had travelled through time. One of these (participant 3) also reported having a feeling of being there, whereas participant 4 did not.

Building on Past Knowledge

The four participants who experienced feelings of being there all found they learned something new in the environment. The two participants who did not feel like they were there already knew about the subject matter or mentally separated the informational videos from the virtual experience. It is possible that learning new things acts as a detail for the conscious mind to focus on (similar to participant 1's focus on the 'nuts and bolts' of the exhibition frames) (Fig. 9), something they would not be able to do by looking at black and white photographs (Fig. 3). It is possible that by distracting the cognitive thought process there is less interruption of the affective processes that create the feeling of presence.

Figure 9. Detail of exhibition frames, Casey Richardson, Casey Dalbo and Stephen Jeal, VR reconstruction of Exhibition of Mass Production, 2020.

The affective immersion of presence and the cognitive reflection of learning represent different phenomenological states of experience: the 'straightforward' and the 'reflective'. The straightforward experience is timeless, forever in the present 'now', being immediate and affective. It is based on action and cannot be explained by the person experiencing it because the moment description occurs it becomes the 'reflective' experience. The reflective experience can be ruminated on, measured in time and is used to establish meaning of events.[17] They are not mutually exclusive as they both happen at the same time, but with different functions. Reflection helps us make sense of an experience, so if the person focuses on the fact that they are in a virtual environment the cognitive awareness that the scene is 'fake' will override any immediate feeling that they are there. A focus on something in the scene, like nuts and bolts or décor (for example) can provide an element for the rational mind to lock onto, tricking it into a suspension of disbelief, which is considered a requirement of presence.[18]

Movement Through Space

The online virtual environments were designed to be viewed in 360-degrees, linked together through different scenes navigated via an arrow at the bottom of the screen. Participants could view the scene with three degrees of freedom (3DoF), which tracks rotation (turning the head) but not translation (moving around the scene). Participants enjoyed seeing the entire scene, stating that it helped them understand the component parts better.

You can go all the way around, and well and that's something, you can look all the way around you don't have to sort of try and put in your mind and picture the photos joining together.

<div align="right">Participant 1</div>

I get to understand more and to actually see an example, rather than just hearing words.

<div align="right">Participant 5</div>

I would say that I've memorised what I've seen on the virtual reality experience more, especially the spatial features and then the colours, and perhaps the context around, like the environment. I think that I can remember better than just reading in the book.
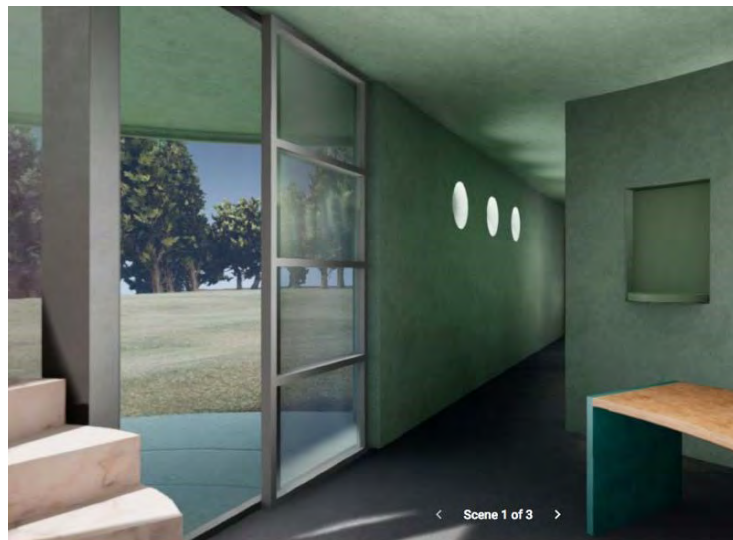
<div align="right">Participant 6</div>

Participants overwhelmingly wanted to move around the virtual environment (six degrees of freedom, or 6DoF) and suggested it as a way to improve the experience. They wanted to be able to get closer to details to see them better and expressed a desire for 'control'. A lack of direct navigational abilities meant that participants could not move towards whatever demanded their attention. However, even without 6DoF movement participants still found the experience helped them experience the flow of movement between spaces. Whether staircase or hallway, each scene contained a visual point of entry to the next space (Fig. 10).

When you get to the end of it the virtual experience and you can spin around look back down the whole length…

… with the exhibition you get a feel for the flow that it was designed to sort of encourage.

<div align="right">Participant 1.</div>

Figure 10. Visual points of entry. Casey Richardson, Casey Dalbo and Stephen Jeal, VR reconstruction of Saturday House, 2020.

This authenticity of movement helped participants understand the architects' original intentions, a crucial aspect for both researchers and students. Architecture is not built for static photographs, it is built to be inhabited and moved through, with each new location revealing itself gradually over time. By linking the spaces together participants understood the flow between spaces and the natural sequence of information housed in the environment. Movement brings together reflective understandings of changing viewpoints Cartesian space, and the personal, affective, qualitative sensations of the moving self.[19] By enabling different viewpoints on a journey, the environment creates a context for the experience that underpins the narrative.[20] Enabling movement through spaces creates an authenticity in the experience that is lacking in a

photograph. Rather than being a voyeur, looking in at the space, the participant becomes an actor, immersed in the experience and can therefore gain a deeper understanding of the architecture.

Discussion

This research demonstrates how video and virtual environments can be combined to provide new avenues for understanding architectural history, in particular for spaces that no longer exist in the teaching, research and museum contexts. The videos contextualise the virtual environment in a brief, informative and entertaining format to help the audience understand the significance of what they are experiencing. They act as the lecturer, museum docent or tour guide and set the expectation for the virtual experience. We suggest that the video tour guide could work towards enabling a feeling of presence in the virtual environment. Having the video tour guide mention details that the audience could search for in the virtual environment could engage the audience's cognitive processes to help distract from the affective, straightforward experience, creating a greater feeling of presence.

Movement is also recommended in the virtual simulation of architectural spaces. The audience should have as much freedom of movement as possible so that they can inhabit the space in a more immersive way . The space itself should also contain movement, such as a breeze blowing through foliage outside. This, together with sound, would create a feeling of dynamic, lived space instead of a static slice of time. The interview results showed that when 6DoF movement is not possible, making the visual journey evident, with the entry and exit visible for each 360-degree scene leading to the next location, was still effective.

Although presence is not essential to a learning environment, people feel they learn better when they are immersed in a simulation compared to reading about it in a book or looking at photographs. Our past research has shown that people do not remember facts well when viewing them in a virtual environment, even if it feels like a conducive learning experience. However, if the goals are to understand the inhabited space of the architecture rather than memorise key elements, or to facilitate discussion in groups, then virtual environments are an effective tool for both researchers and students.[21]

Although integral to gaming, flow is not so crucial when it comes to using VR for more research or educational purposes. Expectations based on participants' past experience were more indicative of feelings of realism or presence than the fidelity of the environment itself. For participants who had less experience in virtual environments, the level of fidelity was pleasing. Participants who had more experience of technology reported being disappointed with the fidelity. Creating task-based activities in the environments (such as finding details mentioned in the video) may be a way to distract from the levels of photorealism for people who are experienced with virtual environments where high degrees of fidelity are not possible.

Conclusion

Both architectural history and virtual heritage aim to teach people about the past. A simulation can provide a learning experience of what it would have been like to walk through the site, and the greater the feeling of presence the greater the intrinsic understanding of how a visitor would have felt in the original building. A video can explain the context and significance, but on its own it does not encourage exploration or allow an understanding of how important elements fit together. Nor does it allow for an understanding of how architecture is both a product and representation of its socio-political context. By combining these two approaches we have demonstrated how informational and situational context can work together to create a meaningful and positive learning experience. These constructed landscapes present the value of the past to an audience that goes beyond the academic journal / conference and the university classroom and poses new questions about the relationships between history, memory and narrative within architectural history.

Endnotes

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