Envisioning New Virtual Spaces for Performance and Theatre artists

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ABSTRACT

Since 2020 working from home has, for many, become the norm since the outbreak of the COVID-19. Furthermore, with large public gatherings either prohibited, limited, or subject to social distancing measures live theatre performed in front of a live audience have been deeply affected. This project experiments with executing performances from home to enable theatre actors to continue to practice and connect with audiences. A series of experiments were conducted to test the possibility of having performers or actors conducting performance from their personal spaces and integrating their work using virtual reality in a combined space for an audience to engage with. This research aims to examine Virtual Reality as an assistive technology in contexts such as theatre performance and use of digital environmental design for actors and performers. The nature of this research project was to determine various scenarios in which a virtual 3D environment can enable, assist and/or enhance a theatre performance for both audience and the actors. For this project a 3D virtual theatre setup was designed, experienced and evaluated by participants drawn from theatre practitioners in the context of focus groups. This article reports on the design and practitioners' responses and how it resulted in an informed VR solution for theatre performance.

Keywords: Virtual Reality, 360-degree camera, Virtual theatre, Assistive technology, 3D-Prototype, Perspective, Theatre, Invisible.

1 INTRODUCTION

The creation of digital environments is becoming an increasingly urgent during a global pandemic, sparking a number of initiatives that attempt to explore and advance how access to art practices might evolve and adapt to maintain or increase accessibility. As Feinstein, a freelance arts and culture writer has commented, with reference to the arts during a global pandemic: "It's a terrible time to go out." [11] The art world has responded with virtual exhibitions, and Virtual Reality (VR) life-streaming of performances of Opera [15] and Ballet [21]. Indeed, VR in particular, has offered "new life and unprecedented access to some of the world's cultural touchstones, some previously financially or physically inaccessible" [ibid]. While the present study shares a broad interest in facilitating accessibility to the arts, research was initiated prior to the global pandemic and focused initially on the assimilation of VR and 360 degree camera technology into live theatre performance. Similar kind of technological intervention has been proposed in order to stimulate different notions of presence for audiences as well as assess how the presence of VR technology might shape and promote different forms of stage movement and address from performers [28].

During several periods of lockdown it has been necessary to adjust the broader research agenda leading to the current experimentation into the design of a 3D virtual theatre environment and examining its differences compared to traditional theatre environment. As professor Elleström reminds us, the "transfer of media characteristics among different types of media always involves transformation to some degree: something is kept, something is added, and something is removed" [10]. This paper addresses the experimental phase of this extension of our larger research project by inviting actors to perform from their personal spaces and integrate them into a virtual environment created using virtual reality software.

The initiative explored in this paper draws on the concept, technology and principles of virtual multiplayer gaming [8], in which players in different locations are able to converge and participate in real-time gaming in a virtual space. Although the notion of utilizing MMOGs appears to align well, the concept of virtual gaming is based on the real-time execution of predefined commands by the user. In the context of VR, factors such as restriction of movements often leads to perceptions of incomplete and disappointing VR experience [3] and seen as a barrier to immersion and act of self-exploration. To date, the greatest benefits from exploring the relationship between theatre and games have so far arguably come from adaptation and incorporation of game concepts into live theatre rather than the use of game technologies to host theatre. For example, embracing categories like 'promenade performance' and 'site-specific play' [17], immersive theatre has sought to increase audience members presence in scenes. As writer and journalist McMullan highlights, audiences are being "given bodily involvement in the action. Sometimes the audience is ushered from one place to another, sometimes they're allowed to explore the space of the play all on their own."

2 DIGITAL ADVANCEMENT IN THEATRE

In recent years, there has been a notable increase in the implementation of technology in theatre [5], however, the roots of current digital or technological advancements can be traced as far back as the early 5th century BC [12]. One such notable advancement to the theatre arena was the introduction of a crane to assist in the illusion of actor flight [12]. As an art form, theatre has demonstrated an openness to the introduction and application of technology throughout its history and evolution. Advancements in technology have been quickly been applied to update audience experience from lighting, sound (e.g., tracked and pre-recorded music) to set design (e.g., rigging, automation). Catherine Love, in writing for The Stage, highlights how today the 'blending' of video or CGI with live action performances have given stage directors "near endless possibilities to work with" [16]. Yet, for theatre to be able to continue to hold up its mirror to human experiences

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Mezzocchi (2021) has warned that it requires theatre to "stop making films during the pandemic" [19] and find ways to continue to practice.

Returning to the manner in which digital technology has played a role in enhancing the theatre experience and aiding audience imagination, a notable example is the 2D video projection technology has been employed by Timothy Bird of Knifedge [27]. In his collaboration with director Mitch Sebastian and lighting designer Ken Billington in a retelling of Pippin, Bird was able to create an immersive environment that places the audience within a virtual video game. As, Bird notes:

Theatre is different than working for a screen, like TV or film. What fascinates me is working with the projected image on 3D scenery, anything that is on stage, and mapping the images into places you don't expect it. I'm not as interested just in the animated image but also the physical space itself and how it supports the imagery helps communicate the storytelling to the audience.

In this way Bird does not seek to treat screens as separate from performance but maps 2-dimensional projections directly into and onto the stage set so performers can interact with, and respond accordingly.

The Virtual Theatricality Lab (VTL) in Henry Ford Community College, Michigan, USA is likewise seeking to establish itself as a pioneer and a "risk-taking institute that combines artistic and technological disciplines" [23]. In a re-working of Shakespeare's The Tempest they explored "3D stereoscopic projection and real-time VR navigated scenery to give new life and meaning to Shakespeare's classic and make it accessible to a new generation of theatre-goers." [24] In this same vein, the internet offers potential that requires exploration. As Lavender argues: "networked connectedness of people as a feature of temporal presence (or, being in the 'now'); its invitation to absorption and a form of immersion; its disposition to … personal presentation. All these lend it to the warp and weft of theatrical presentation, albeit through a medially distinct set of operations" [14]. Following these examples, the current research project also seeks to facilitate theatre performance via the application of Virtual Environment design and remote performance. The role of technology in the evolution of theatre was recognized by the practitioners participating in this research, providing support and rationale for the current experimentation:

Theatre was and is always evolving, because even during the earlier centuries of 5th century BC, they didn't have light, they'd just use daylight. And then obviously, with technology changes, they use candles, then stage lights and change the actual staging. Similarly, they used different props to create sounds, but now they can use recordings

The experiments outlined in this paper address initial steps in the application of Virtual Reality and 360-degree cameras within theatre performances.

3 PROJECT

3.1 Objective and Significance

The main objective of this study was to evaluate the impact of experimenting with site-specific theatre performance in a virtual space in which two or more actors are driving a performance from their own personal space. This improvisation in the application of VR as an assistive technology, is a consequence of the current global pandemic caused by Covid-19, that is shutting down productions, affecting livelihoods and removing cultural practices and events that support individual wellbeing [18]. Many industries and organizations have the option of allowing employees to work from home (e.g. via email, zoom or skype meetings). Like other professions, theatre needs to craft a space of its own. Indeed, the term theatre refers to a space for a group of people (a public) to witness presentation. Theatre as David Wiles suggests, "is pre-eminently a spatial medium, for it can dispense with language on occasion but never with space" [31]. How actors and audiences are configured in those spaces can vary considerably within live and site-specific theatre. The way in which the shared enterprise of theatre brings people together is preserved so long as the "present-ness derived not only from the presence of the performers but the affective engagement of the spectators (or indeed participants)" [14] is maintained.

While pre-recorded theatre works or performances can be viewed through online platforms such as Youtube or Facebook, immersion cannot be achieved through these experiences as they do not account for "the creative and constitutive role played by audiences" [1]. In an article exploring the value of 'liveness' in the current climate, Alice Savill cites Musical Theatre Director and Producer Adam Lenson, who comments: "We're just giving people more excuses to argue that digital theatre is just crap film" by promoting pre-recorded content [25]. The article identifies key elements missing from the viewing pre-recorded theatre include a) the 'power of assembly' (meeting point in time), b) 'wonder' that it is 'happening, right now' c) ephemeral nature of the moment and d) the possibility of interactivity and witnessing the live performance as a group (creating a shared experience). The significance of this study, is that it explores Virtual Reality which does possess the capacity to trigger immersion and interactivity as the audience and actors are virtually teleported to a virtual space [28]. This study aims to design the virtual space in order to provide the mood, tone and theme to the audience as well as the actors. The study does not aim to concentrate on the aesthetic side of immersion, mood or tone of the performance, rather the technical side of designing a virtual environment and its Possibilities for actors and audience.

3.2 Experiment Study

This experiment was designed to create a virtual space or environment using a VR game engine in order to evaluate the idea of producing a theatre performance within a virtual space. Creating a virtual environment from scratch is time-consuming, so pre-designed assets that can be constructed and customised to build a virtual environment (available via a game engine) were utilised for the current experiment. The space was tested with single and two character setup.

3.3 Procedure

A virtual environment was designed using the open source game engine Unreal Engine 4.0. Two virtual environments scenarios were created: 1) An environment in which the actor can move around and operate using the touch pad sensors on a wireless hand controller and 2) an environment in which the actor can move around and operate using a teleportation mechanism using the wireless controller. These test environments were employed to study and evaluate how having performers in a virtual environment changed or affected their performance. Both the scenarios revealed different results from the participating actors and this article reflects on those findings using a focus group interviews, which were conducted on the participants after their VR experience.

3.4 Virtual Scenario Design (Environment)

A virtual environment is a 3D modelled space created using 3D software: Autodesk Maya and Unreal Game Engine 4.0. The software provides certain tools and functionalities which aided the design of a functional virtual test environment. Since this study revolves around the idea of performers working within a virtual space, there were no requirements at this stage in terms of complex algorithms, coding or programming. A more important strategy was the identification and selection of a scene with narrative and context that prompted curiosity, connectivity, arousal, and social connection [4] between performer and audience. It was possible to 'build' a scene with practitioners by adding detail such as designing and placing properties within the virtual environment to support and situate the performer. Steps were taken to design and create a space, containing the necessary ambience, properties and lights for a scene to take place. The 3D designed scene consists of an interior theatre space, containing a stage, curtains, audience seating, textures and lighting to provide an experience of a traditional theatre space. This was constructed by, the chief researcher of this project, with the help of certain 3D modelling softwares and royalty free 3D models. Previous interaction with the participants, prior to the experiment and literature pointed out the fact that lighting, colour and textures would play a major role in creating a 3D VR environment and hence the priority and focus were concentrated on creating realistic textures to the models. The reality of environment is an important component to enhance engagement in digital mediums [4]. In order to enhance realism textures were collected from a theatre performance space situated at the Gallagher Academy of Performing Arts inside the University of Waikato in Aotearoa New Zealand. Upon designing the VR space the participants were allowed to explore the VR environment both statically or with free motion depending on their preference, in order to get the maximum experience.

3.5 Movement using Teleportation

This is a test scenario in which the actor/participants only movement was from a designated point A to point B. This is not a continuous or flow movement and the actor just vanishes from point A and reappears at the selected destination of point B, which can be anywhere inside the virtual space. This is a most basic form of movement tool used in VR softwares. Teleportation is proved to be faster than walking or touch pad sensors [13] and Bowman et al. found that instant teleportation is correlated with decreased spatial orientation [9]. The performers were provided with interactive objects in the environment and given the opportunity to first explore the space on their own. For the most part performers attempted to scrutinize the entire environment to assess how it might be incorporated or usable in the context of their performance. The program allowed the actor to perform certain interactions with the objects like pick up the interactive object, stack them, throw and catch them. According to Nield's definition [22] such objects and scenarios qualified the environment as a potentially "immersive theatre space". Nield defines immersive theatre as participants positioned inside an 'experience' rather than at an exhibition-within a tricked-out space with props as well as artefacts (2008: 531). This environmental setup also provides the necessary essence and idea for the larger research project that intends to allow the audience to have a presence on the stage using the VR gadgets in a way that they are not a hindrance for the actor or the performance. For example, viewing a performance from objects or props positioned on stage.

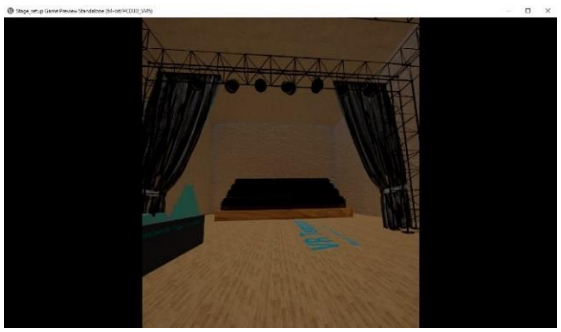

Figure 1: VR environment with teleportation.

3.6 Movement using Touchpad Sensors in the Wireless Hand Controllers Significance

This is the second scenario which has been edited for this experiment study. It is also designed with respect to Nield's definition of immersive theatre space. In this environment the actor is able to make fluidic movement inside the defined space using the touch pad sensors in the wireless controllers. The movement of the character inside the space (moving front, back and sideways) are controlled by the touch pad sensors, however in order to turn and look in any specific direction the actor must use his or her HTC Vive head controller. The performer was provided with similar exploration time. This scenario is different from the previous one as it involves fluidic movement of the actor from point A to point B rather than just teleportation. This helps in the continuity and flow of the entire sequence, but with the limitation of using the touch sensor for the movement. The fluidic movement of the actor in the space potentially offers more immersion as the performer is able to connect their touch pad movement to the virtual movement however they are confined seated in one single place in the physical space, restricting their natural movement. This test can be viewed in a positive frame of mind because it shows that movement and interaction in a virtual space is not reliant on the body of the performer to be able to move in a particular direction, this has potentially unrestrict the performer from any physical contraints (e.g. injury) and can use this type of scenario for their own advantage. This is a just branch of one possible outcome in a way VR can assist people with regards to disability who can still chase their dreams in the field of theatre and acting.

Figure 2: VR environment with touchpad sensor.

3.7 VR Experience and Focus Group

The designed VR environment was tested with participants who are associated with theatre (practitioners and actors) as well as regularly theatre audience members to achieve a better understanding result and outcome. The health and safety protocols such as fire hazard, clarification about visual, auditory issues and

motion sickness associated with the VR experiement, were maintained during the VR Experience and Focus group session as per the ethical norms

The participants were briefed with instructions about the aim of the project, how to use the VR equipments, what to be expected and about the gadgets involved for the experiment. They were allowed to experience and free explore the virtually designed 3D theatre space. The experience was not documented and instead they were asked to participate in a focus group after they finished the VR experience.

4 FINDINGS

The focus group was directed in such a way that the participants' understanding of Virtual Reality, theatre performance, its evolution, comments about this particular experience along with the future enhancement and its possible applications were discussed. The idea of digital enhancement being a great improvement for the theatre performance itself [27] was acknowledged by the participants in the focus group, for example:

Theater was and is always evolving, because even when they began, they didn't have light, they would just use daylight. And then obviously, with technology changes, we use candles, then stage lights, we changed the actual staging. We changed how things were set with like seats, affects us and different technology now.

An interesting perspective was put forward by one of the participants that the theater in itself is intrinsically classist and in the present time theater has become a bourgeois activity while cinema has become more of a thing for everyday folks, when hundreds of years ago theater had that role. This statement can be supported by the findings of Aleksandra Wiśniewska et al [32]. Their findings state that cinema which has substantially higher viewers compared to theatre, contributing about 215 million EUR more than theatre productions. The use of VR highlighted a tension between increasing accessibility and popularity whilst maintaining its status as a high art form. However, the experience of engaging directly with VR in this context provided a more balanced response from participants than maybe solely interviewing practitioners. This would have run the risk of a more negative evaluation of VR to preserve the status of the medium.

From engaging with VR participants expressed very positive thoughts about the VR design of this experiment, the textures, colour and the lighting made the experience feel more in-context and added an immersive element to the VR space as a performer. Color and lighting of the environment seem to have an impact on peoples' affect and behavior [26]. Therefore the detailing in the design of the VR theatre space was given top priority, since realism is an important component to enhance engagement in digital mediums [4]. In order to attain the maximum possible immersion (which will create the feeling of real environment in the participants' mind) audio and visual interactions must also be given the same priority as the visual textures and lighting. Scholars Anıl Çamcı and Rob Hamilton emphasize the importance of every digital possibility (hardware, software, visual, audio and human perception) together can encapsulate the nature of how VR will evolve [6]. Similar observation and comment was also passed on by one of the participants stating the VR environment can be improved to better quality if there is some ambience theatre sound, along with sounds of footsteps. In addition the movement inside the VR space was also criticized stating that the process of traveling from point A to point B is not as effective as walking through. It deteriorates the immersive experience and the essence of being in a theatre stage. A participant stated :

When I see a stage, I want to kind of walk normally. And using the buttons it's not organic. So teleportation did not make you feel like it's a smooth transition.

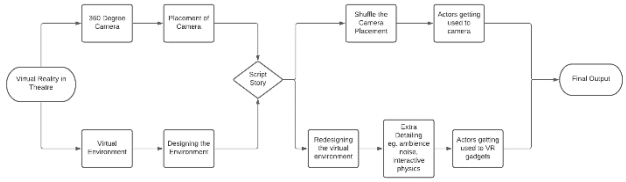

Figure 3: Production blueprint for a VR assisted theatre.

This project has helped to develop a basic understanding for the production pipeline for a theatre production assisted by Virtual reality. It is explained in the figure above. This research has also pointed out the importance of an effective coherent story and narrative to keep the audience engaged, curious and connected with the actor [4].

4.1 Impact of VR on Actors

The virtual environment designed for this experiment study was tested with the participants exploring the space to gain the insights from an actor's perspective in order to understand how virtual environments can be modified or designed to suit the needs of a theatre performance in general. Though the environment was designed using a game engine, this research study analyzes the environment as a virtual theatre space and the character as an actor. Since the participants were required to move physically in order to explore the VR setup, they were provided with a rotating chair, so that they can comfortably access the entire 360 degrees. The participants did find the controls and navigation to be simple and user friendly, however the physics inside the VR environment was a tricky to get around in the beginning. One of the participants stated:

I wanted to play with the interactive blocks and create absolute blocks, but at the very beginning I got confused why I can't do that. I didn't realize that just because I put one block into another one.

Both the scenarios give out new and different findings & perspective about the application of VR. The teleportation environment was considered a basic virtual immersive environment for the actor and the movement was binary from point A to B. Although it did not help in the fluidic transition it was interactive, immersive and it can be better compared to having the actor docked to a single point in the environment where they do not have to move and just deliver a monologue. It can also be considered for the use of having the audience use this docked position and view, experience and immerse themselves in the play. This style of play was tested by James Martin Charlton & Magnus Moar [7]. However they state that engaging the audience in such an invisible perspective, will have them ghosted and the audience will not be 'in' the play. This statement can be argued enough if the entire play is being devised around a static object and the audience is able to view the entire play from the position of the static object. This scenario can still be under consideration for application and would definitely suit many devised theatre performance.

Similarly the second scenario of providing the actor with touch pad sensor has a different application impact, which is a novel idea and finding from this particular research study. The use of touch pad sensors to move in the virtual environment does provide immersiveness and interactivity to the actor or participant who is actually being seated in a chair (in the physical world). Physically the participant/actor is denied his or her motion of legs but in the virtual environment he/she can walk or run anything inside the VR space. This is a very novel idea of applying this technology in the theatre spaces to the people who have temporary or permanent disability. Fidelity is integral in design decisions to enhance the realism of the experience[30]. The fidelity in designing the VR environment is important for the actors to experience the realism and the immersion of the same environment.

4.2 Impact of Virtual Scenarios in Theatre Performance

Virtual reality and its application can afford more than just the gaming and immersive experience. If these affordances are exploited in their right context and if the theatre performances are devised as per technological necessities, it can result in a unique form of immersive theatre experience. Since 2000 Punchdrunk has pioneered a game changing form of immersive theatre in which roaming audiences experience epic storytelling inside sensory theatrical worlds. ("Punchdrunk", description on the Sleep No More New York website). Audiences can be easily placed inside the virtual environment and the technology also provides the option to have the audience invisible or visible to the actors. The importance of the audience has always been a theatrical truism [3]. The main essence of this research study is that neither actors nor the audience are required to be physically present in any common space, yet they can experience the feeling of togetherness. Rose Bigging in her book explains the act of immersion and immersive theatre as the audience and performer sharing the same space; presence is merely the act of being present for the gaze of another. [3]. Virtual reality can afford the application of projecting the actor or audience as a character designed specifically for the environment or with finer investment and research it is also possible to have the projection of the audience in order to achieve a better sense of immersion.

Virtual Reality has been the experimental medium for more than a decade [2]. It has been applied and used as an assistive technology in many fields especially in the gaming industry. This project is a predecessor for the idea of implementing virtual reality in the field of theatre performance. Nevertheless the idea of this research is to slowly and gradually experiment virtual reality in the theatre medium, which is why the entire idea of using VR as an assistive technology in theatre is being broken in smaller research studies and experiments. The entire aim or focus of this research study is to assess the effectiveness and impact of using a virtual environment as a medium to bring the actors and audience together virtually at the same time keep them physically distanced from each other. In this particular study the actor is allowed to experience two virtual scenarios as mentioned previously. The test experiment and the scenario is very preliminary and low budgeted, the actor/participant is provided with VR gadgets like an HTC vive and two hand controllers. They are restricted to a confined chair and the movement in the virtual environment is controlled using the hand controllers only.

5 CONCLUSION AND SIGNIFICANCE

The overall takeaway from this experimental study is that how VR assist theatre production and performance from the perspective of an actor, who is an integral part of show and production. It helps to mimic the idea of immersive theatre with the application of virtual technologies and gadgets. Any actor who is performing in physical or virtual space and if they are acknowledged or felt immersed in the environment is a successful performance, since actors thrive on the audience and the interactions between themselves [20]. This same technology can be applied on the audience to have them virtually present in the performance, by which they qualify as an active participant through the actors acknowledgment and the immersive experience provided by the VR technology.

The other outcome of using a scenario based on the idea of using touch pad sensors in hand controllers for virtual movement is quite debatable due to the effectiveness of being confined in a static chair and being able to move around the virtual space is quite tricky and contradicting for the mind to read and get used to. However this experiment scenario did help in finding out that this idea of virtual movement using the touch pad sensors can work for certain specific or devised plays or performances. Also it can be effective for certain types of actors and audiences who dream of experiencing or be a part of the play but limited due to their physical or mental illness.

The aspect of voyeurism in the VR version of Fellow Creature brings into play the notion of touching things which do not belong to the viewer. This points towards Dixon's dreaded VR porn dystopia. But the voyeurism of Fellow Creatures is part of a basket of affects and purposes. In watching the drama as an invisible presence, the viewer can consider the meanings and implications of the scene in which they lurk. We move away from the fields of pornography and avaricious desire, towards art's abilities to encourage those encountering it to think, to feel, to consider, to empathise, and to wrestle with the existential problems of human life. In De Officiis, Cicero refers to Plato's use of the story of Gyges and suggests that a good person would not use invisibility to wreak evil, as they possess moral rectitude. We do not have to accept Cicero's neat division of humanity into those with moral rectitude or without seeing that VR offers us a means of invisibility which can be used for the creative and democratic purposes of art.

6 REFLECTIONS

Evaluating the experimental study from the perspective of a media technician it is fascinating to explore the affordances Virtual Reality can bestow on theatre medium. Video calling, skype sessions and zoom meetings have shrinked the world and reduced greater distance and made the world a better place during the present crisis of COVID. Similarly Virtual technologies and the softwares has the potential to do similar achievements in the field of theatre and performance. There are research institutes and laboratories who are keen to invest in this modernistic idea of VR application in theatre performances and this experimental research study would serve as a benchmark for the future exploration of Virtual theatre performance, which could be a new branch of theatre production. This also gives rise to the possibility of rendering environments in 3D and projecting them in real theatre space or vice versa, which will be researched in the successive experiments of this research.

This project also provides the opportunities for bringing theater to others, rather than providing opportunity for gamers to get into a theater space. It can be valuable for people living in isolated areas so that they can easily watch a production company conducting performance in a major city like Auckland or Wellington while they are physically present in Gisborne. In addition it can also be useful for people undertaking long hours of travel in bus or train or in an

aeroplane, where at least 4 out of 10 people would be keen to try the experience during their travel.

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