Reconsidering “Liveness”:

Interactivity and Presence in Hybrid Virtual Reality Theatre

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Abstract

This M.A. thesis project examines the intersection between virtual reality and theatrical performance. In this study, "liveness" can be understood as the responsiveness of a digital environment to the inputs of the viewer in addition to the sharing of a spatial and temporal continuum between a performer and a viewer. This project will examine two virtual-reality adaptations of Shakespeare's stage play *Hamlet – Hamlet 360: Thy Father's Spirit* and *To Be with Hamlet*. It will also examine performer-viewer relationships in two immersive virtual-reality theatre performances – *Chained: A Victorian Nightmare*, and *Elevator #7*.

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Chapter One: Introduction

Artists and theatremakers have experimented with virtual reality technology for years, using the innovative medium to stage performances, tell stories, and experiment with immersive virtual worlds. Brenda Laurel's 1993 book *Computers As Theatre* attributes the development of head-mounted displays as the primary iteration of virtual reality hardware to "...Scott S. Fisher at the MIT Media Laboratory, Atari Systems Research, and NASA Ames Research" and highlights American influences in virtual reality such as "NASA, Autodesk, VPL Research, Dr. Fred Brooks' laboratory at the University of North Carolina, and the new human interface lab at the University of Washington under the direction of former Air Force researcher Tom Furness". (185) These early researchers explored the role of virtual reality primarily in STEM contexts, but Laurel claims that virtual reality technology has been influenced by art and popular culture throughout its development. "The notion of virtual reality has been enhanced by the fiction of William Gibson (inventor of 'cyberspace') and other writers in the Cyberpunk genre, as well as the Holodeck construct developed by the creators of *Star Trek: The Next Generation".* (185) Laurel also traces artistic predecessors of headset-based virtual reality to interactive environments and technologically mediated performances such as Myron Krueger's VIDEOPLACE, an artificial reality laboratory project from the mid-1970s.

Computers as Theatre explores the potential for technological innovation to create new dramatic forms and closes with a discussion of virtual reality. Laurel's final chapter is titled "Post-

Virtual Reality: After the Hype Is Over". (199) Under the subheading "The Anatomy of a Fad", Laurel describes how

> As the VR meme started to flame out in northern California in 1992, many of us involved began scrambling to change our shingles from virtual reality to something roughly synonymous but less tainted- telepresence, augmented reality, immersion technology. Anything to get some distance from the all too vivid spectacle of the hype-fueled, VR road-and-media show that rocketed VR pundits to the pinnacle of pop culture and then sent us burning back into the atmosphere, noticing too late that we were in the decaying orbit of a fad. (200)

Laurel compares this boom and bust of virtual reality in the early 1990s to another presumed "fad": the video game industry, which had crashed in 1983[1]. Laurel claims "both [virtual reality and video games] became fads as the result of how they were perceived by the people who managed the relationships between the technologies and popular culture". (200) Since the early 1990s, when *Computers as Theatre* was published, virtual reality technologies have waned and waxed in popular culture and the consumer market. Virtual reality has become intertwined with the video games, which has ballooned into a $120 billion USD industry[2] with a strong presence in popular culture. Although commercially available virtual reality technology has become intertwined with the video game industry, the medium still has the potential to create new dramatic forms, including hybridized forms of theatre. Theatrical projects that use virtual reality are distinct from video

[1] The 1983 video game crash refers to the rapid decline of Atari, who controlled 80% of the video game market in 1982. By 1983 the C.E.O. had been accused of insider trading and the company was forced to bury unsold inventory of a game based on "ET: The Extra-Terrestrial" in a landfill in New Mexico. https://www.newyorker.com/business/currency/excavating-the-video-game-industrys-past

[2] https://www.businessinsider.com/video-game-industry-120-billion-future-innovation-2019-9

games and film in several ways. This project examines these differences and explores the characteristics of the hybrid virtual reality theatre.

Despite longstanding interest in virtual reality, the technology has only become commercially viable in recent years. Commercially available VR headsets have not reached their predicted state of ubiquity, but they have surpassed early commercial flops such as the Nintendo Virtual Boy and Sega VR.[3] SuperData, a Nielsen subsidiary that collects data on the video game market, reports that worldwide VR revenue reached 3.3 billion USD in 2019[4]. With virtual reality headsets becoming more accessible, theatrical experiments in virtual reality have the potential to reach a wider audience.

The examination of virtual reality theatre requires two key terms: "liveness" and hybridity. These terms must be defined and examined in conversation with one another, as hybridizing two or more forms of media complicates the definition of liveness within each of those forms of media. For example, a live theatre performance may use closed-circuit video to display a camera's view of the stage action. The video feed captures live action and displays it to an audience without the intervention of editing, and thus is considered live. However, this "liveness" is different from the "liveness" of bodies on stage due to the relationship between the performer and the audience assembled in the theatre for the sake of a performance.

The selection of scholarship I will discuss in this chapter focuses on the concept of "liveness" as it relates to theatre performances. Theatre performances are examined alongside

[3] 2016 was predicted to be the year that virtual reality would finally go mainstream due to the investment and development by large tech companies such as Facebook, Sony, and Google. https://www.bbc.com/news/technology-35205783

[4] https://www.superdataresearch.com/blog/superdata-xr-update/ This report notes that sales of home VR systems slowed due to supply issues rather than slowing consumer demand

other forms of art and performance such as television, film, digital art, installation, and performance art. This chapter includes colloquial sources to present how working theatre practitioners understand the concept of "liveness" outside a purely theoretical discussion. These sources, such as production diaries, reviews, and editorials by culture writers highlight the use of "liveness" in the contemporary public lexicon, which shifts rapidly compared to academic nomenclature.

The definition of what constitutes "live" performance has been altered and stretched by the invention of new technologies. Early recording technology established a clear binary of "live" versus "recorded" performance, but later innovations complicated this binary. The understanding of what qualifies as a "live" event varies across technological eras and artistic disciplines.

While searching for a working definition of "liveness", one might turn to the first instances of recorded performance. The "phonautograph" is the earliest known sound recording device, patented in 1857 by French inventor Edouard-Leon Scott de Martinville.[5] The phonautograph used a flexible membrane to transcribe vibrations, but did not have the capability to play back the sound it recorded. Thomas Edison's phonograph, which allowed sound to be recorded and played back by the same device, was invented in 1877. August and Louis Lumière used their Cinématographe to host what is believed to be the first public screening of a moving picture in March of 1895.[6] The phonautograph and the Cinématographe emerged within 38 years of one another. Recording technology continued to rapidly evolve and innovate, with the first feature-length film to feature synchronized dialogue, *The Jazz Singer*, premiering in 1927.[7]

[5] https://www.npr.org/templates/story/story.php?storyId=89380697
[6] https://blog.scienceandmediamuseum.org.uk/the-lumiere-brothers-pioneers-of-cinema-and-colour-photography/
[7] https://blog.scienceandmediamuseum.org.uk/very-short-history-of-cinema/

The emergence of early recording technology allowed for performance to be divided into a simple binary of either "live" or "recorded". Early audio recording devices such as the phonograph[8] required the source of the sound they sought to record to be in close physical proximity of the recording device. These early recording devices were purely mechanical, limiting transmission of recorded sound to physical means. This era of recording lasted from the phonautograph in 1857 until the advent of electric microphones in the 1920s[9]. With these mechanical recording devices, the binary of "live" versus "recorded" audio was clear. The next major shift in recording technology introduced electronic recording technology such as the electronic microphone, which provided a technological mediator between the source of the audio and the audio recording. Early electrical recording also allowed for further mediations such as compiling different takes into a master disk or recording multiple tracks separately and compiling them into one master recording. By the 1970s, analog electric and magnetic recording technology was surpassed by digital recording technology[10]. In 1979, *The New York Times* called digital recording "the first radical change in the basic method of sound recording since the advent of the electrical process in 1925" and explained that "because digital recording is only information *about* [author's emphasis] sound, rather than an image of the sound, it is not susceptible to the distortions of tape hiss and print-through that occur when a conventional tape is copied". (nytimes.com/archives) With digital recording's ability to minimize auditory flaws, it narrowed

[8] The phonograph was the first device that could both record and play back sound, and was invented in 1877 by Thomas Edison. The phonograph was preceded by Charles Cros' photoengraving, and Edouard-Leon Scott's phonautograph.
[9] https://www.wired.com/2011/01/birth-of-the-microphone/
[10] https://www.nytimes.com/1979/11/04/archives/digital-recording-techniques-are-already-being-widely-used-in-pop.html

the distance between original and copy. Digital recording also allowed recorded media to be manipulated and mediated with grater ease than analog recordings.

These mediations introduced complications into this category of "recorded" performances. A performance could be recorded "live" and then edited, creating a recording with recognizable differences from the original performance(s). The advent of the radio, which allowed for simultaneous broadcasts further disrupted this binary by allowing a performance, e.g. an orchestra, to be transmitted to a remote listening audience without the delay of recording and replaying. These examples of innovations in audio recording technology illustrate how rapidly technological mediation complicated the category of "recorded" performance. However, the division between "live" and "recorded" performance is frequently interrogated in relation to television rather than radio. Claudia Georgi in *Liveness on Stage* claims that "although theatre has always been a live medium, its liveness only gained center stage with the successive invention of film, television, video and other technological media. With the spread of mediatization, the liveness of theatre could no longer simply be taken for granted and seemed to be threatened by mediatization" (Georgi 12). According to Georgi, the potential for "live" audio performance through radio did not pose the same definitional threat to the liveness of theatre as mediums with a visual component.

Peggy Phelan's *Unmarked: The Politics of Performance* makes the following claim about the ontology of performance: "Performance's only life is in the present. Performance cannot be saved, recorded, documented, or otherwise participate in the circulation of representations of representations: once it does so, it becomes something other than performance. To the degree that performance attempts to enter the economy of reproduction it betrays and lessens the promise of

its own ontology" (Phelan 146). This strict definition of performance excludes much art that is technically mediated due to technology's capacity for recording and reproduction.

In his influential 1999 book, *Liveness: Performances in a Mediatized Culture*, Philip Auslander examines the relationship between "live", and "mediatized" performances. Auslander understands these two categories not as a strict oppositional binary, but as "parallel forms that participate in the same cultural economy". (Auslander 5) Although recognizes that traditionally "live" performance such as theatre is forced to compete with the mass media for a share in the market of the entertainment industry, he locates the source of this conflict outside the different forms of media.

> Although I have stated that the relationship between the live and the mediatized is one of competitive opposition at the level of cultural economy, I do not see that opposition as deriving from the intrinsic characteristics of live and mediatized forms but, rather, as determined by cultural and historical contingencies". (Auslander 11)

Although television, to Auslander, qualifies as a "mediatized" form of performance, he argues that "the essence of the televisual was understood, from television's earliest appearances, as an ontology of liveness more akin to the ontology of theatre than to that of film" (12). Essentially, real-time television broadcasts may be technologically mediated, and thus, recorded, but are received as "live" by viewers. This shared, or similar, sense of liveness pushes theatre to

distinguish its liveness from the liveness offered by television, as theatre participates in the cultural economy.

Auslander offers television as a medium against which theatre can define its own liveness. However, the rise of streaming media has not only changed the way the public engages with television, it has the potential to fundamentally change television as a medium, impacting how the concept of liveness is understood in mass media. In a 2015 *New York Times* article boldly titled "Streaming TV Isn't Just a New Way to Watch. It's a New Genre" James Poniewozik claims that streaming television is fundamentally shifting, in content and format, away from broadcast television. Poniewozik notes that with content available at the convenience of the viewer, television shows made for streaming can ignore narrative conventions of broadcast television, such as cliffhangers to keep viewers engaged, or exposition after commercial breaks to capture the attention of viewers tuning in mid-broadcast. As well as the narrative freedom streaming affords to serialized television, Poniewozik's article explores another, subtler alteration that streaming television affords the medium. Using Vince Gillian's acclaimed AMC series, "Breaking Bad" as an example, Poniewozik claims that streaming television's compressed viewing conventions can alter the meaning of narratives written for broadcast television. He explains,

> The live viewer saw Walter White's change distended, in slow-motion; little by little, he broke badder and badder, in a way that emphasized the gradual slope of moral compromise. The binger saw him change in time-lapse, in a way that suggested that the tendency to arrogance and evil was in him all along. (12/20/2015)

Poniewozik employs a definition of liveness, referring to the "live viewer" of "Breaking Bad" who watched the television series as a weekly broadcast over the course of five years. According to Poniewozik's analysis, this "live viewer" experienced a thematically distinct version of anti-hero protagonist Walter White than the "binge viewer" who viewed multiple episodes, ad-free, in rapid succession via a steaming service. Here, television's "liveness" is distinguished not by content, but on the broadcast's demands on the viewers' schedule. This definition of liveness situates the media viewer as an arbitrator or liveness.

With the viewer in control of their viewing schedule, streaming television creates another categorical distinction between streaming and broadcast television, where all broadcast television may be considered "live" due to its format, not its content. The prominence of streaming television is a relatively recent phenomenon. Streaming giant Netflix started as a DVD-rental by mail service and introduced a streaming service in 2007. By 2010 this service was offered as a stand-alone subscription, independent of Netflix's DVD rental service. By 2018, the streaming service subscription became the company's biggest source of revenue, with over 130 million subscribers.[11] In the rapidly changing media landscape, and its impact on the public lexicon relating to liveness may emerge more clearly as the medium evolves. With a potentially oversaturated market of services, some critics speculate that streaming television may regress into the cable television model[12], and the cultural impact of streaming giants such as Netflix will decrease.

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[11] https://www.britannica.com/topic/Netflix-Inc

[12] Vox writer Emily VanDerWerff predicted in a 2016 article titled "Netflix or Hulu won't win the streaming wars. Your cable company will" that cable companies would emerge victorious in the so-called "streaming wars", as the proliferation of competing streaming services necessitate a return to the "bundle" pricing model. She also notes that cable companies control the majority of broadband internet in the United States, allowing them to profit from streaming media even as they lose television subscribers. https://www.vox.com/new-

Streaming television's impact on television as a medium is also examined by Sonia Saraiya in "TV Is Dead. Long Live TV". Saraiya cites the release of media giant Disney's dedicated streaming service as a tipping point in the crowded streaming service marketplace. She highlights the rapid pace at which streaming giants like Netflix have changed television. Auslander's second edition of *Liveness* was published in 2008, and a decade later, streaming content created a radically different media landscape. Saraiya claims "As recently as a decade ago, television was not a thing you streamed, but *the stream*- the live feed, the prime-time programming, the newest content. TV was not just the show, but the commercial breaks that interrupted it, the news that preceded it, and the machine itself".

Many of the theories on liveness included in this investigation are also interrogated in *The Archeology of Liveness*, a 2015 dissertation by Dries Vandorpe. *The Archeology of Liveness* traces the semiotic history of terms relating to "liveness" and examines the varying usages of liveness across various theoretical frameworks and artistic disciplines. The resulting project demonstrates that the cultural understanding of "liveness" flexes with technological innovation, but this flexing does not occur consistently. Vandorpe recognizes the insufficiency of the current classification model of liveness, claiming "The integration of technology in the theatre has made possible new representational practices. However, those practices are unaccounted for by the classification model. It is at this point that the prevailing classification model becomes strained and the forward thinking in the field becomes unduly constrained." (Vandorpe 20). A key step in seeking a classification model that satisfies the current understanding of liveness in Theatre, Performance

money/2016/10/13/13156848/netflix-hulu-amazon-cable She followed up on this prediction with a 2019 article, "The future of streaming is the cable bundle", which evaluated how the streaming market changed since 2016. https://www.vox.com/culture/2019/3/15/18225269/streaming-future-cable-netflix-hulu-disney

Studies, and Broadcast studies, is interrogating binary classifications of "things" that are live versus "things" that are not live.

In addition to the basic binary of "live" versus "recorded" performance, Vandorpe discusses and dismisses the binary of "live" versus "mediated" performance, and the distinction between "live" and "immediate" performance, claiming that all experiences are mediated in some sense, and that truly immediate performances are impossible. The mediations identified are technological, and those made by human sense organs, which receive and therefore mediate every sensory input. From a theoretical standpoint, this argument allows for the dismissal of "mediated" as a distinct category of performance separate from "live". But is this reflected in practice? Are audience members consciously aware of the mediation of their sensory organs?

Asserting that the function of sense organs in receiving performance means that every performance is mediated allows theorists who subscribe to this notion to also dismiss "immediate" performance as a useful category, where the term "immediate" identifies a performance that attempts to "erase all traces of material artifice from the viewer's perception". (Vandorpe 193) Vandorpe summarizes this idea saying, "Essentially, 'performance' is never manifested *ex nihilo*… In other words, the mere idea that performance can be immediate is fallacious" (Vandorpe 193). Virtual reality is named alongside television and film as mediums that attempt to achieve a sense of immediacy. However, if immediacy impossible, virtual reality must rely on alternative definitions of liveness.

The scholarship examined in this chapter presents a range of definitions of liveness that demonstrate the difficulty of identifying an ontology of live performance that works across disciplinary lines. For theatre practitioners, the question of liveness has higher stakes than just

concern over outdated or overly restrictive theory. As Auslander asserts in *Liveness*, theatre must defend its status as "live" to distinguish itself from other art forms in a crowded cultural economy. In an essay titled *Why Live?: A Question for 21st Century Theatre*, playwright and director Jordan Tannahill argues that theatre must recognize and value its status as a "live" artistic medium not only to compete economically with other entertainment forms, but to preserve the artistic integrity of the theatrical experience. Tannahill asks,

> In an era where the screen reigns supreme, why live? The dual reading of this question is intentional. What keeps us alive? And in a moment when our lives are becoming increasingly virtual, why bother telling stories the old-fashioned way, with a bunch of bodies gathered in a room?" (37)

For Tannahill, the importance of liveness is directly connected to the communal experience shared within an audience, as well as the spatio-temporal relationship between the audience members and performers. Tannahill ties this relationship to theatre's ability to generate an empathetic response in audience members. "A play, even a boring one, is rooted in an empathetic desire to commune with others… The vital theatre of the twenty-first century will be the theatre that innately understands why it's a live event and reminds us why we, as humans, continue to live" (38, 39). Tannahill recognizes Auslander's claim that our understanding of theatre's liveness came about after the innovation of cinema and related recording technologies, but he notes that many theatres are still operating under a "precinema" model. Tannahill's essay reads as glowingly optimistic at times, but he is right to highlight the power of affective responses between audience

members and performers. However, if his theatre must rely on affect and empathy to distinguish itself in the saturated entertainment economy, hybrid mediums that create affective responses in digital environments would pose a threat competitively.

This anxiety about the role of liveness in theatre is explored in an essay on *HowlRound*, Emerson College's online theatre discussion commons. It features a discussion between artists and university professors Michael Wheeler and Sydney Skybetter titled *Digital + Live Performance: Exploring the Present and the Future.* Reflecting the digital topics of discussion, the essay is formatted as a modified Slack[13] conversation, complete with timestamps, screennames, and avatars. Skybetter and Wheeler identify the economic pressure that drives the need to distinguish theatre from other forms of art and entertainment. Skybetter identifies liveness as a "last bastion" for the art of theatre, observing that people gathering is one of the last unique selling points that "live art and church have in the platform wars." And he later added, "There is something to liveness as last bastion. I can't say I like it" (howlround.com).

This conversation reflects an anxiety surrounding theatre's aesthetic identity in a technologically saturated world. If liveness is all theatre has to offer against entertainment platforms such as streaming giants, blockbuster cinema, and video games, a core element of the art form could be reduced to a cynical marketing gimmick. For Wheeler and Skybetter, liveness is an insufficient "last bastion" for the art of theatre because digital technology is approaching a threshold where the sense of liveness in a digital space can potentially rival the sense of liveness of the theatre stage. Recounting an anecdote from the 2019 Conference for Research on Choreographic Interfaces, Skybetter writes,

[13] Slack is a copmany that provides a workplace communications platform designed to replace inter-office email conversations. https://slack.com/features

> A historian of theatre was like, *I know motion capture is great and all, but won't liveness always be central to theatrical experience? ...* One of the engineers told the historian to his face (gently, but knowledgeably, convincingly, and firmly) he was wrong. Consumer-ready, immersive technologies that do affect management/liveness are coming. Maybe not as 'well' as a show in a theatre, but good enough for most people, most of the time. It has billions and billions of dollars of R&D behind it. And it's owned, entirely, by private corporations.

This understanding of liveness is tied to affect management, specifically affective cues such as micro expressions, posture, and other embodied communications.

Analyzing Auslander's and Phelan's ontology of liveness and performance, Matthew Causey writes in *Theatre and Performance in Digital Culture,*

> Phelan argues that performance is defined through its non-reproducibility. Phillip Auslander counters that the live is an artifact of mediatization. Liveness exists not as a prior condition, but as a result of mediatization. Both arguments are problematic… Disputing the argument of Phelan and amending Auslander's, I suggest that the ontology of performance (liveness), which exists before and after mediatization, has been altered within the space of technology. But how? (30)

This project asks a similar question to the technology of virtual reality within the specific context of theatrical performance.

Liveness, as a concept, proves to be a difficult thing to confine within a single definition that fits the hybrid form of virtual reality theatre. Even if a shared ontology of liveness can be defined that would encompass the liveness of both traditional stage plays and digital art, an audience member/viewer would continue to perceive the two events as distinct. The perceived qualities of liveness are different. Therefore, instead of seeking a unifying definition of liveness, this thesis project will examine the distinct qualities of liveness present in the hybrid medium of virtual reality theatre. These qualities include concepts that are associated with liveness, such as presence and interactivity. The concept of "hybridity" will serve to better understand virtual reality theatre as a medium that encompasses understandings of liveness from the world of theatre and from the world of digital art. Steve Benford's and Gabriella Giannachi's *Performing Mixed Reality* studies "mixed reality performances" that combine digital technologies with theatrical performances at the "cutting edge of live performance". (1) They claim that "mixed reality performances generate hybrid spaces that span, often intertextually, physical environments and virtual worlds" (27). The performances that will be analyzed in this project create both physical and digital performance spaces. Examining the hybrid space created in each production will provide a framework for analyzing the audience-performer relationship in virtual reality theatre.

Chapter Two: Interactivity and Presence in Virtual Reality

The previous chapter outlined some of the many competing or contradictory definitions of "liveness". Instead of framing and attempting to solve liveness as a problem that is related to digital art, this thesis project will focus on alternate understandings of liveness that are prominent in virtual reality. Some aspects of virtual reality theatre help scholars to distinguish this hybrid medium from virtual reality films and virtual reality video games. The first liveness-related concept to explore is "presence".

Like "liveness" the definition of "presence" flexes depending on the theoretical framework and the academic discipline in which it is used. Several examples of how different disciplines use the term "presence" are examined in *Archaeologies of Presence: Performance and the Persistence of Being,* edited by Gabriella Giannachi, Nick Kaye, and Michael Shanks. In *Archaeologies of Presence,* "…the critical examination of presence is approached in the convergence of performance theory and archeological thinking. Occurring in relation to situated acts, 'presence' not only invites consideration of individual experience, perception and consciousness, but also directs attention outside the self into the social and the spatial". (1) The meaning of "presence" is examined through the intersection of performance and to archeology, where the concept of "presence" encompasses both stillness and movement, appearance and disappearance. Presence is also examined through multiple relationships. These relationships include performers and audience members, but also aims to examine the role of presence outside the individual. In

examining the role of presence in multiple disciplines, *Archaeologies of Presence* summarizes debates over the function and nature of presence. The introduction explains, "In performance theory and practice, presence is both fundamental and highly contested. In theatre, drama and performance, debates over the nature of the actor's presence have been at the heart of key aspects of practice and theory since the late 1950s". (2) Giannachi, Kaye, and Shanks note that technological mediation has featured prominently in the discussion of the role of presence in performance, adding, "These discourses concerning the performance of presence have frequently hinged on the relationship between the live and mediated, on notions and effects of immediacy, authenticity and originality". (2) *Archaeologies of Presence* explores multifaceted aspects of presence, as well as the complex history of the term in academia. Later chapters focus on concepts from various performance disciplines such as environmental presence, co-presence, photographic presence, and absence/presence.

For the purposes of this study, the concept of presence is derived from theatre and performance studies scholars who are interested in exploring affective responses in spectators/audience members.

In addition to editing *Archaeologies of Presence,* Nick Kaye and Gabriella Gianacchi have written several articles on the subject of presence. In "Acts of Presence: Performance, Mediation, Virtual Reality", they explain that "in computer science, presence is a core element in the operation of immersive virtual reality technologies…'presence research' into immersive modes of VR places emphasis on the qualia - or sensation and intuitive feeling - of 'being present' in an overtly illusory three-dimensional environment." (88)

The virtual environment investigated in their article is the CAVE, a small, four-walled room where multiple projectors that create the illusion of a three-dimensional environment. Kaye and Giannachi's exploration of presence is also useful for other immersive virtual reality environments such as those created by headset-based VR systems such as the HTC Vive and Oculus Rift. The digital environments created for VR headsets intentionally create an immersive three-dimensional environment. Kaye and Giannachi claim that, "because of the participant's spatial mobility, scenarios for CAVE are implicitly theatrical" (88) A participant in a headset-based virtual reality experience is also afforded spatial mobility. Depending on the hardware, the participant's spatial mobility may only be limited by the boundaries of the virtual environment, or the physical space in which they are using the headset. VR systems such as the HTC Vive use room-mapping to track the participant's movements inside a given space, and the system will warn the viewer when they are approaching a wall.

This creates a tension between the actual space and the virtual space, where the exploration of the virtual space is confined by the physical space hosting the virtual reality experience. Many video games designed for virtual reality circumvent this limitation by allowing users to point their controller's crosshairs at a point in the distance and press a button to instantly jump to that point. With this virtual teleportation, users can explore as much of the environment as is digitally rendered, regardless of the confines of their physical environment. Depending on the user's ability to navigate digital space, a range of interactivity with the environment is created.

For example, in *Hamlet 360: Thy Father's Spirit* users' interactivity with the environment is limited by the technique used to record the theatrical performance. Headset-clad viewers see through the eyes of a panoptic 360-degree camera. They can move their heads to see different parts

of the environment, but are limited by the camera's position. *Hamlet 360* was developed through a partnership with Google, and Google has their own virtual reality headset, the Google Daydream. Unlike more complex systems such as the HTC Vive, the Daydream does not have room-scaling or body tracking. The headset houses a smartphone that plays video, and the user is limited in their interactions with the filmed immersive environment.

In the immersive digital environment of a virtual reality project, various aspects and forms of presence can be analyzed. Co-presence can occur between viewer and performer. The user may have a digital representation of their embodied presence. The immersive nature of virtual reality allows for the creation of a convincing affect of being present in a virtual environment. In this study, presence in the digital environment of virtual reality is examined in conjunction with the concept of interactivity.

Interactivity with the environment is a key component of *To Be with Hamlet,* a virtual reality adaptation of the encounter between Prince Hamlet and the ghost of his father, King Hamlet. Unlike *Hamlet 360* and the interactive experiences of *Elevator #7* and *Chained: A Victorian Nightmare*, *To Be with Hamlet* allows for multiple users to share the same digital environment. Innovative multi-user technology connects up to 15 people using the HTC Vive. Spectators see digital representations of fellow headset-wearers, creating a digital communal audience experience. The animated three-dimensional environment offers more flexibility than *Hamlet 360* while still taking spectators through a predetermined sequence of events. From the ramparts of a computer-generated Elsinore Castle, audience members can turn their heads to scan the horizon of the digital Denmark, taking in the craggy foothills surrounding the castle, and the mountains in the distance. Looking down reveals the grey flagstones of the castle and looking up unveils a starry

night sky. When the performance begins, a dense fog envelops the castle, prompting Horatio and Hamlet to climb the ramparts. The Vive headsets allow the users to "follow" the actors, maintaining the shared space even as the action moves along the castle battlements. When the apparition of King Hamlet appears, the ghost towers over the young prince and the assembled audience. This scene is strongly reminiscent of Russian director Grigori Kozintsev's 1964 film *Hamlet*[14], which features an armored ghost that appears to tower over Prince Hamlet. (figure 1) In

Fig. 1: A still from Grigory Kozintsev's 1964 film *Hamlet.* The frame shows a partial view of the ramparts of Elsinore castle and the ghost of King Hamlet in a full suit of armor and a flowing cape. Image source: https://thescriptlab.com/features/screenwriting-101/7555-story-behind-screenplay-grigori-kozintsevs-hamlet-1964/

Kozintsev's film, the ghost is shot from low angles, looming over the camera. The terrified Prince Hamlet is shot primarily from high angles and a straight-on perspective, gazing upward at the ghost. In the shot-reverse-shot, back-and-forth dialogue between King Hamlet and Prince Hamlet, the murdered king's full armored form is visible, creating a commanding physical presence.

The Prince is shot primarily from the chest up, further highlighting his diminutive physical presence compared to his father. The camera also moves slowly, panning over shots of Elsinore's

[14] https://www.imdb.com/title/tt0058126/

castle, as well as the turbulent sea it borders. The cinematic techniques used by Kozintsev play with the disparity in size between the two characters and establish the camera as a moving observer of unfolding events. In *Shakespeare, Cinema, and Society,* John Collick discusses how the cinematography of Kozintsev's *Hamlet* distinguish it from Laurence Olivier's 1948 *Hamlet*[15]. He compares how the camera frames Elsinore castle in each film. Collick writes, "Kozintsev's *Hamlet* was intended partly as an antithesis to the English actor's [Laurence Olivier's] psychological reading… Kozintsev's landscape is vast, limitless and only partly comprehensible. There is a strong feeling of subjectivity… behind the drifting viewpoint; the impression that the action, characters and text are part of a vast an intricate dream world". (135) According to Collick, the "drifting viewpoint" of Kozintsev's film prevents the viewer from remaining an objective observer of Prince Hamlet like the viewer of Olivier's *Hamlet.* Instead, the viewer of Kozintsev's film shares a sense of unease with the protagonist. A similar solidarity between viewer and subject is pursued in *To Be with Hamlet* using techniques distinct to virtual reality rather than cinematography. Instead of the slowly shifting viewpoint of Kozintsev's film, the "camera" in *To Be with Hamlet* is controlled by the user wearing the head-mounted display (HMD). The shifting viewpoint of the user reflects their subjectivity within the digital environment and removes them from the role of objective observer.

Like Kozintsev's ghost, King Hamlet in *To Be with Hamlet* wears a full suit of plate armor and is scaled much larger than the digital prince Hamlet. Prince Hamlet and the users must physically look up to take in the full height of the dead king's specter. The ghost beacons Prince Hamlet to a different part of the ramparts, which in turn prompts the viewers to follow this

[15] https://www.imdb.com/title/tt0040416/

command by using the HTC Vive controllers to navigate to a new part of Elsinore castle. The audience is immersed in this digital environment, effectively bringing them into a communal space with the actors whose digital avatars represent King Hamlet and Prince Hamlet.

In addition to presence, the second concept that can enhance the understanding of "live" in the context of virtual reality theatre is interactivity. Interactivity is present in varying degrees in each virtual reality theatre production discussed in this thesis. The simplest form of interactivity present in all four projects is the viewer's ability to use movement to alter their view of the virtual environment. David Rokeby, in *Subjectivity and Control in Interactive Media* claims that "A technology is interactive to the degree that it reflects the consequences of our actions or decisions back to us" (Rokeby 133). For example, if a viewer of *Hamlet 360* moves their head to the left, this movement is read by a gyroscope and is reflected back to the viewer by the change in what they see. The users of *Hamlet 360* do not alter the narrative through their choices, but they do alter how the narrative is presented to them visually.

Rokeby outlines four models of interaction[16], one of which, the "navigable structure or world" uses virtual reality as a primary example. He explains,

> The navigable structure can be thought of as an articulation of a space, either real, virtual, or conceptual. The artist structures this space with a sort of architecture and provides a method of navigation… Exploring this structure presents the spectator with a series of views of the space and its contents. The sequence in which the spectator experiences these vistas forms a unique reading of that space. In virtual reality systems, the architectural metaphor can be taken literally. (138)

[16] The four models as defined by Rokeby are "a navigable structure or world, a creative medium in its own right, a transforming mirror, or an automaton". (138)

In *Hamlet 360,* the navigable structure is the 360-degree set filmed by the panoptic camera, and the method of navigation is a gyroscopically-responsive binocular video and virtual-reality headset. This is the simplest navigable structure presented in this chapter. The viewer can continually interact with the environment, but their interaction is limited. However, even with this limited interactivity, the viewer has the ability to construct a reading of *Hamlet 360* that reflects their actions.

Although Rokeby's model of interaction provides a useful framework for understanding virtual reality as a navigable structure, he claims that most of these structures function similarly to a maze or labyrinth, with no goal or exit. The narrative present in *Hamlet 360* and *To Be with Hamlet* provide a structure and a clear endpoint for their users. This strains Rokeby's metaphor of a maze or labyrinth. It does not necessarily disqualify "navigable structure" as a useful term but shows the limitations of this understanding of interactivity.

Another one of Rokeby's four models of interactivity focuses on the participant's subjectivity inside an interactive environment. He calls this model the "transforming mirror", where a participant's image or presence is reflected back to them. Rokeby explains, "While all interactive works reflect interactors back to themselves, in many works the idea of the mirror is explicitly invoked". (Rokeby 145). *Hamlet 360* plays with subjectivity by giving the user a role in the production. The user sees through the panoptic eyes of the 17-lens, 360-degree camera that was used to film *Hamlet 360.* If the headset-wearers glance into a mirror while inside the virtual reality experience, they will see the pale face of a gaunt man staring back at them. When the ghost speaks, his voice fills the viewer's headphones to create the impression that the dead King's voice

is emanating from the viewer's head. This use of the mirror transforms the viewer's subjectivity, integrating their presence into the production as a separate character.

Other virtual reality theatre projects present a more complex navigable structure and multiple methods of navigation, as well as using a transforming mirror. *Chained: A Victorian Nightmare* uses real-world elements with digital counterparts to blend the physical and the digital in the experience's immersive environment. Before donning the VR headset, users must first gain access to *Chained* by knocking three times on a heavy wooden door with a large wolf's head door knocker. An actress answers the door and invites the user into a small room. Putting on the headset reveals a digital recreation of that same small room, with a large mirror on the wall. Reviewing the experience for Quartz, Ashley Rodriguez describes the moment when "A ghastly arm reaches through the mirror and pulls you out of the real world and into the Victorian nightmare", merging the physical and digital environments. Rodriguez's description demonstrates the power of the illusion created by *Chained.* Although the ghostly arm reaches through a digital mirror inside a digital representation of a real-world room, Rodriguez still describes the digital room as the "real world". *Chained* continues to blend the physical and digital worlds to enhance the interactivity of the digital environment throughout the 20-minute experience. In this immersive theatrical experience, interactivity is created through a synthesis of digital world and physical objects. The navigable structure of *Chained* extends beyond the digital environment.

One key "object" is the actor's body. An actor wearing a motion capture suit guides the user through the physical space. The motion capture suit allows the actor to appear in the digital world, switching between multiple fully-animated appearances. The actor also directs the participant to interact with physical objects, such as a chair, that exists in both the physical and

digital realms. The actor also asks the participant personal questions and incorporates their answers into the narrative of *Chained.* The interactivity of *Chained* involves both the physical and the digital environments.

Another model of interactivity relevant to the hybridization of theatre and virtual reality is examined by Daniel Homan and Sydney Homan in *The Interactive Theatre of Video Games: The Gamer as Playwright, Director, and Actor.* Homan and Homan compare the recent trend of interactive narratives in video games to interactivity in live theatre. Homan and Homan's understanding of interactivity depends primarily on the viewer's ability to influence narrative. In the hybrid virtual reality theatre, this understanding of interactivity is present in varying degrees.

Interactive theatre is defined in opposition to what Homan and Homan call "conventional legitimate theater", where audience interactivity is limited. Speculating about the longevity and legitimacy of forays into interactive theatre, they claim,

> Nothing in the theatre can replace a good production of *Hamlet* or Stoppard's *Rosencrantz and Guildenstern Are Dead.* Experiments with more interactive theater that offer an emotional or intellectual involvement beyond that of the spectator who remains in the house, where audience reaction is limited to applause, may remain just that - experiments, attempts to put a new twist on an older, more conventional legitimate theater. (183)

Homan and Homan are speculative about theatre's ability to integrate audience interactivity through narrative changes and offer video games as an example of a medium in which this

emergent storytelling is successful. Virtual reality, a platform frequently used by video game developers, offers a similar form of narrative interactivity found in video games.

The language used to describe the spectator in virtual reality shares similarities with the descriptors of participants in immersive installation artworks. Johannes Birringer, in *Performance, Technology, & Science* posits that digital technology is changing the relationship between art and audience. He writes of interactive museum installations, "The dissolution of the separation between 'show' (spectacle) and passive audience is the direct result of the scientific and technical accomplishment of real-time performance and installation" (180). This dissolution of the barrier between audience and performer by technological advancement is intentionally pursued in virtual reality. In each virtual reality theatre production examined in this thesis, the barrier between performer and audience is navigated both technologically and narratively.

Birringer also examines how interactivity impacts the role of the audience. He explains, "these participatory installations are often conceived as performance, and they have grappled with allocating new 'roles' to the former audience now called active visitor, user, immersant, participant, interactor, co-author, player, gardener, etc. (180). If, as Birringer claims, interactivity turns viewership into performance, the "role" of the audience member becomes active. In virtual reality, the medium allows a baseline level of interactivity due to the navigable structure of the virtual environment. The use of the term "participant" to re-frame the audience member of interactive performance is also present in the language of virtual reality performance.

In virtual reality theatre performances, "liveness" can be understood in terms of interactivity and presence. Defining liveness using these concepts sidesteps the fraught ontological debate of "but is it live" in order to focus on the "live" aspects within virtual reality performance.

In each virtual reality performance examined in the following chapter, presence and interactivity appear in various iterations, with some projects offering digital environments that respond to the viewer's input. The illusion of presence created in these virtual reality projects creates a viewer-performer relationship distinct to this hybrid medium.

Chapter Three: Four Virtual Reality Projects

This chapter details the four virtual reality theatre projects discussed in the previous chapters and discusses the use of interactivity, presence, and liveness in each project. The first two are adaptations of existing stage plays, *Hamlet 360: Thy Father's Spirit* and *To Be with Hamlet. Chained: A Victorian Nightmare* takes its inspiration from Charles Dickens' 1843 novella *A Christmas Carol*, and *Elevator #7* draws inspiration from several non-narrative sources. These selections are not intended to provide a representative sample of all theatrical performances that use the medium of virtual reality. These projects were selected because they represent a spectrum of several elements that are used in this thesis to characterize virtual reality theatre.

1) *Hamlet 360: Thy Father's Spirit*

Hamlet 360: Thy Father's Spirit is an adaptation of *Hamlet* presented in immersive, stereoscopic virtual reality. Of the four projects, its platform presents the lowest technological barrier to accessibility. *Hamlet 360,* a collaboration between the Commonwealth Shakespeare Company and Google, showcases the Google Daydream View VR headset. The video of the performance is available to view in full through the YouTube channel of Boston public radio station WGBH.[17] Their official website informs the viewer that "The 360 video is best viewed using a VR headset, such as the Google Pixel phone with Google Cardboard or Daydream View".[18]

[17] https://www.youtube.com/watch?v=Jc88G7nkV-Q&t=3s
[18] https://www.wgbh.org/hamlet360

The Daydream, unlike the HTC Vive used by the other three projects, uses a smartphone to achieve a three-dimensional virtual experience. This increases the financial accessibility of *Hamlet 360*,[19] but limits the capabilities of the virtual environment.

Hamlet 360 is a pre-recorded performance. It is the only virtual reality theatre project examined in this chapter that does not employ actors in real-time in its environment. However, the project is firmly rooted in theatrical aesthetic and practice. The artistic director of the Commonwealth Shakespeare Company, Steve Maler, sees virtual reality as a dynamic frontier for theatre artists. He explains "The possibilities as a new medium are really exciting, and I think theatre practitioners are uniquely positioned to be successful in this medium - we understand this notion of sustained performance, the immediacy and intimacy you can build with an audience of the arc of a performance" (americantheatre.org). Maler sees virtual reality as a site that facilitates an intimate encounter between audience and actors. In *Hamlet 360,* this intended encounter between actors and audience is facilitated by "casting" the viewer in the play.

In *Hamlet 360,* the viewer sees through the eyes of a panoptic camera comprised of 17 lenses that allow the camera array to capture 360-degree video. The camera functions as the ghost of King Hamlet, played by Jay O. Sanders. When Sanders speaks, his voice reverberates stereoscopically through the viewer's headphones to create the aural illusion that the ghost speaks from within the viewer's own head. Inside the VR environment, the headset-wearers can turn and investigate a mirror and are greeted by Sanders' ghostly face staring back at them. In order to "cast" the viewer in this manner, the adaptation of *Hamlet* formed around King Hamlet, having to

[19] At the time of writing, a Google Daydream View second generation retails at $99 USD. A foldable cardboard viewer that fits a range of smartphones called Google Cardboard is also available. Prices for this bare-bones virtual reality viewing system range from $11.50 to $17.50. Other viewers made from plastic or nylon are also available through Google, with a maximum price of $39.95 (https://arvr.google.com/cardboard/get-cardboard/)

narratively justify his presence in each scene. What emerges is a haunting *Hamlet,* with the viewer's presence looming over Prince Hamlet, played by Jack Cutmore-Scott. Characters directly address the ghost, peering directly into the camera. These direct addresses to the viewer are an important visual element of the "intimate encounter" Maler intends the experience to facilitate.

According to Maler, the audience-performer relationship in a virtual reality environment varies from that of a conventional theatrical house. He explains,

> Virtual reality puts you inside of a space and transports you to there, so you're not watching the art, you're *in* the art. It puts every viewer in the best seat in the house, the seat that we've chosen them to be in, as opposed to in a theatre where your perspective is not always optimized" (americantheatre.org)

Maler seeks to use virtual reality to transcend what he sees as limitations in conventional theatre spaces. While he claims that theatre practitioners are uniquely poised to explore the frontier of virtual reality performance, he views the medium as an opportunity to overcome barriers of accessibility and spread works of theatre to wider audiences. In particular, he sees virtual reality as a potential pedagogical tool to bring Shakespeare into the classroom. He claims,

> The model of taking shows to schools is not the optimal way for kids to experience this material for the first time. We see [VR] as another way of bringing this material to life in the classroom. It is just another iteration of watching a film version of Shakespeare, but one where you actually get to immerse yourself in the play.

> Virtual reality is not about watching, it's about experiencing." (americantheatre.org)

Maler does not provide his reasons for doubting the practice of bringing Shakespeare to the classroom by "taking shows to school", but says this method is not "optimal". Again, Maler expresses the desire to "optimize" the theatrical experience by using the technologically advanced medium of virtual reality to deliver adaptations of Shakespeare's popular works. Maler's quotations and his ambitions for the collaboration between theatre artists and virtual reality artists demonstrate an uncertainty about how to classify this hybrid medium. He uses language from both film and theatre to describe *Hamlet 360.*

This blending of both cinematic and theatrical language to compellingly describe *Hamlet 360* is also present in the Commonwealth Shakespeare Company's advertising and marketing materials. A blurb promoting a special screening of the project reads[20], the

> Commonwealth Shakespeare Company has taken Shakespeare's most iconic play to meet the cutting edge of immersive storytelling in *Hamlet 360: Thy Father's Spirit*, embracing the immersive power of VR to plunge the viewer into Hamlet's harrowing journey. It is a 60 minute, cinematic, 360-degree adaptation that explores new dimensions of the medium by casting the viewer as the Ghost of Hamlet's dead father, giving the viewer a sense of agency and urgency as an omniscient observer, guide and participant. (commshakes.org)

[20] http://commshakes.org/production/hamlet-360-thy-fathers-spirit/

The description of the adaptation as "cinematic" conflicts with the active, participatory role given to the viewer as the Ghost, which is not possible in conventional cinema, where the viewer observes a static, curated series of images. *Hamlet 360*'s use of virtual reality resists normative conventions of cinema by giving the viewer control over the camera. The viewer effectively steps into the role of cinematographer, curating their own viewing experience that dynamically reacts to the direction of their gaze.

Any viewers willing to spend an hour to see this virtual-reality adaptation on YouTube by using their personal smartphone, will step into the world of *Hamlet 360. Hamlet 360: Thy Father's Spirit* opens with an establishing shot of the 360-degree set, with swirls of computer-generated white smoke dissipating as the camera lowers from a vantage point to an eye-level shot. This allows the viewers to hold a large portion of the set in their field of vision before their view is limited by the eye-level positioning of the camera. After looking around the set, their attention is captured by the movement of 5 actors who are engaged in combat. Several of these figures fall, slain by a distressed young man. A motion blur disguises a camera movement that brings the viewers closer to Prince Hamlet, now being restrained by another man. Tension builds, with string instruments drowning out Hamlet's shouts until the action begins to reverse, with the fight playing out in reverse until the characters exit the scene. Other parts of the set are still. The viewer is free to look at any portion of the 360-degree set at any point of the production. When *Hamlet 360* draws the viewer's attention to a specific part of the set, a motion blur disguises the reorientation. One of these motion blurs is used to re-center the viewer's gaze on Hamlet. He is perched on the edge of a clawfoot bathtub filled with filthy opaque water, while other actors are moving in another portion of the set. A man in a black suit lounges on a four-poster bed while a woman in a black dress sits

at a vanity. *Hamlet 360* gives its viewers the freedom to control the gaze of the camera but intervenes when it appears necessary to reorient the spectator's gaze. This interrupts the immersive experience of virtual reality. The viewers can freely move their heads to explore *Hamlet 360 but* are not given control over the entire experience.

Although the viewers may find these motion-blurring scene transitions counterproductive to the exploratory medium of virtual reality, the visual effects matched the ghostly aesthetic. The white fog that ushers viewers into the 360-degree set remains in the peripheral of the headset. Looking down, viewers can see that fog swirling around the place where their feet should be. Although the viewer is "cast" as the ghost of King Hamlet, there is not an embodied representation of the dead king at this point in the performance. Nor is there is a visual representation of the viewer's embodied presence in the virtual environment. Another motion blur shifts the scene again, centering the viewer's gaze on a four-poster bed where a drunk Claudius is lounging in Gertrude's lap while she is gazing affectionately at him. Prince Hamlet stands on the bed, speaking directly to his mother.

She does not acknowledge him. Like the spectator, Hamlet goes unnoticed by his fellow performers. (Figure 2)

Figure 2: Hamlet (Jack Cutmore-Scott), Claudius (Faran Tahir), and Gertrude (Brooke Adams) pose on the four-poster bed seen in the first minutes of *Hamlet 360: Thy Father's Spirit.* Photo by Matthew Niederhauser *wgbh.org/hamlet330*

The scene shifts again, and with this shift, the camera rises to above eye level. The viewers are looking down at Hamlet and Horatio who recoil in horror. They can now see the ghost whose gaze the viewers control. The apparition is accompanied by the flickering of the multiple light sources that litter the set. Glancing quickly around, the viewers can count at least twenty lamps and several elaborate chandeliers. Next to an illuminated tank of water, the headlights of a silver four-door sedan flash on and off. The ghost begins to speak, and a booming voice fills the viewers'

headphones. As the ghost continues to speak, Hamlet stares at the viewers and begins to slowly shuffle sideways. If the viewer chooses to follow him, he maintains eye contact. This is the first moment in the production where viewer, camera, and ghost clearly collapse into a single role. This exchange between the ghost of King Hamlet and his son is the longest uninterrupted scene so far in *Hamlet 360,* and the relatively slow pace of the action emphasizes the connection between the viewer and Hamlet. A flashback showing Claudius poisoning King Hamlet seamlessly appears in the corner of the frame. Where previously motion blurring and digital smoke were employed to conceal transitions, this flashback uses a distinctive visual language to set it apart from the diegetic action of the scene. The confrontation between Hamlet and his father concludes with the ghost grasping his son by the shoulders and demanding that Hamlet remember him. The ghost's arms do not appear in the viewers' frame of vision, rather their presence is suggested by the way Hamlet holds his body as if he is being held off the ground. A lighting effect suggests the presence of a shadow being cast on Hamlet's face and torso. The impact of this is startling. Hamlet is as close to the camera as he will ever be, and the degree of presence possible in virtual reality is high.

The camera pulls out to indicate a shift in the ghost's corporeality. Once again, the viewers are observing the action without the actors recognizing their presence. The screen briefly goes black and a curl of white smoke sweeps across my line of sight, providing the first blackout scene transition in *Hamlet 360.* When the fog lifts, it takes the viewers several moments to recognize their surroundings, creating a sense of disorientation. Looking around reveals that the viewer now finds themselves submerged underwater. The eye of the camera is hovering above Hamlet's stomach as he lounges, still clad in his suit, in a large claw-foot bathtub. By positioning the camera in the bathtub with Hamlet, *Hamlet 360* continues to foster a closeness between Hamlet and the

viewer. The medium of virtual reality enhances this closeness through the immersive virtual environment.

Unlike the other virtual reality theatre projects examined in this chapter, *Hamlet 360: Thy Father's Spirit* is also available on a non-virtual reality platform. The production can also be viewed on YouTube without a head mounted display. The viewer can navigate the panoramic video through simple controls on the screen, or by clicking and dragging the cursor on the video. In this configuration, the affect of presence created in virtual reality disappears. The viewers no longer rely on their embodied presence to manipulate their viewpoint. In this configuration the cinematic qualities of *Hamlet 360: Thy Father's Spirit* emerge. While the viewer may still act as a sort of cinematographer, controlling the camera with a cursor transforms the ghost from a seamless avatar for the viewer's gaze to a clumsy device. The panoptic camera jerks around the set abruptly when controlled by a cursor, and the smoke that swirls in front of the camera to disguise a scene transition appears artificial rather than part of the environmental diegesis.

Hamlet 360: Thy Father's Spirit exists outside the medium of headset-based virtual reality. It is also the only production examined in this chapter that consists entirely of pre-recorded elements. Therefore, it forms the bottom end of the spectrum of "liveness" as understood in the hybrid virtual reality theatre. Its 360-degree set forms an environment of limited interactivity which nevertheless provides a degree of viewer involvement that sets it apart from cinema.

2) *To Be with Hamlet*

To Be with Hamlet is another adaptation of Shakespeare's *Hamlet* that uses virtual reality to deliver a theatrical experience. The creator and producer of *To Be with Hamlet,* Javier Molina,

teaches motion capture performance and heads the VR Lab at the NYU Tandon School of Engineering. Without the resources of a tech giant like Google, *To Be with Hamlet* relied on the backing of NYU and on individual donations solicited through the crowdfunding site GoFundMe.[21] *To Be With Hamlet*'s press kit and promotional materials embrace a conventional understanding of the concept of "liveness" and promote the project as the "first-ever theatrical performance in virtual reality"[22]. The landing page of the production's official website declares,

> *To Be with Hamlet* is a live theatre performance in Virtual Reality that allows anybody anywhere to have an intimate experience with *Hamlet*, Shakespeare's dramatic masterpiece. The experience enables audiences to walk the battlements of Elsinore Castle with Hamlet as he confronts the ghost of his murdered father. By utilizing cutting-edge multi-user Virtual Reality technology, the production also enables participants to see their fellow audience members in virtual space in real-time, creating a virtual immersive theatre experience like no other. (hamletvr.org)

The creative team behind *To Be with Hamlet* views the production as a primarily theatrical experience that uses the medium of virtual reality to deliver a live theatrical production. The liveness present in *To Be with Hamlet* is achieved by placing actors in motion-capture suits and transcribing their movements directly onto digital avatars in real-time. Unlike *Hamlet 360: Thy*

[21] https://www.gofundme.com/f/hamletvr The project raised a scant $3,710 USD of its $150,000 USD goal, with the bulk of funds contributed by a single donation.
[22] https://www.tribecafilm.com/filmguide/to-be-with-hamlet-2017 This promotional blurb advertised the production's debut at the 2017 Tribeca Film Festival

Father's Spirit, To Be with Hamlet creates a virtual environment that can be shared by more than one spectator at a time. The experience of viewing *Hamlet 360* is a solitary one, requiring the viewer to commit to over an hour of cordoning themselves off from the outside world with a virtual reality headset. The viewing experience of *To Be with Hamlet* focuses on a communal experience, where an audience can gather in the digital environment. *To Be with Hamlet* partnered with M3Diate, described on their website as "...a content creation, collaboration and communication company focused with the single goal of giving you a sense of presence with others regardless of dimensions, time and place" (m3diate.com). M3Diate's multi-user virtual reality platform allows *To Be with Hamlet* to place up to 15 individuals, each wearing an HTC Vive headset, into the same digital environment. Participants can see digital representations of their fellow audience members as they navigate the walls of Elsinore castle (Figure 3)

Fig. 3: The digital representations of three audience members observe the ghost of the murdered King Hamlet in *To Be with Hamlet*, *hamletvr.org*

M3Diate also allows *To Be with Hamlet* to use spatially-responsive audio that alters what spectators hear depending on their proximity to the source of the sound within the digital environment. M3Diate pursues affective presence in their technological platform, and *To Be with Hamlet* engages this multifaceted telepresence in a performance context.

To Be with Hamlet also incorporates a feature common to virtual reality video games, allowing audience members to "teleport" around the digital environment by pointing one of their HTC Vive controllers at a point in the distance and clicking a button, which instantly transports them to that point in the environment. This interactivity, while not seamless, allows audience members to explore a larger portion of the castle ramparts than their limited spatial mobility would otherwise allow.

Using digital representations of real-time actors allows *To Be with Hamlet* to alter the scale and appearance of the actor's digital avatars.

A striking feature of this adaptation is the larger-than life King Hamlet, an armored figure who towers over both his son and the assembled audience members. (Figure 4)

Figure 4: A size comparison between the digital avatars of Hamlet (Zachary Koval) and the ghost (Roger Casey) *hamletvr.org*

To Be with Hamlet is framed as an "encounter" with the classic text, and the intimidating stature of the ghost attempts to provoke in the audience the sense of fear and awe that Hamlet expresses at the apparition of his father. In a feature published in *Mixed Reality and the Theatre of the Future,* Gochfield and Molina explain how *To Be with Hamlet* clarifies the stakes of the scene. They claim that in conventional staging, the audience lacks a clear understanding of the potential threat the

ghost's apparition poses to Prince Hamlet, explaining, "In most productions of the play, the urgency of this fear is lost because the audience can never perceive the physical danger and so the desperation that leads Hamlet to chase after the Ghost is diminished". (49) They explain how their staging of the scene allows the audience to understand the stakes for Hamlet. "But if we stage the scene (as we have) on the farthest ramparts of the castle, on a platform surrounded on three sides (and far below) by the ocean, and allow the audience to walk to the very edge of the castle walls and look down at the water, the sense of remoteness and danger is made palpable. A viewer looking over the parapet may even experience vertigo". (49). The digital environment of *To Be with Hamlet* allows the viewers to share a visceral reaction to the appearance of the ghost alongside Hamlet.

This desired reaction described by Gochfield and Molina is primarily a physical one that may be induced through interacting with the digital environment. However, this physical response to the environment is the starting point to what the project's creators hope is a pathway to a deeper understanding of the source material. Gochfield and Molina explain, "Our hope and belief is that, by allowing the audience to be immersed within the world of the play, and to feel present with the characters as the scene is playing out, they will find a different and deeper understanding of the story and the character's inner states". (48) The importance of presence to the desired outcome drives technological decisions.

To Be with Hamlet uses motion-capture technology and live-streaming to deliver a performance in real time. The digital environment of Elsinore castle is built in Unreal,[23] a suite of free development tools frequently used in video game development. Most interactive VR environments are built in game engines. Game engines, Gochfield and Molina explain, "handle

[23] https://www.unrealengine.com/en-US/vr The Unreal engine is currently available in its fourth iteration, and is used in the development of video games, virtual reality experiences, and augmented reality applications.

the complex computations required to simulate real-world lighting and physics, allowing the game designer to construct a set out of 3D models and specify what kinds of interactions the player can have with the world. This makes building a VR world feel almost like constructing a theater set" (49). The digital environment was designed for remote accessibility, with audience members accessing the production via remote "holodecks", a phrase borrowed from Janet Murray's *Hamlet on the Holodeck,* cited by the creative team as a key inspiration for *To Be with Hamlet.* A development diary entry from August of 2016 chronicles the process of testing multiple holodeck locations in Shanghai, London, and New York City, each able to host 15 people. As these holodecks were being tested, the team was also developing a system where potential audience members could download the digital environment via a digital marketplace such as Steam into which real-time performances would be livestreamed. This approach reduces the bandwidth required to view the performance, cutting down of the technical requirements on the parts of both the audience and the production team.

While *Hamlet 360: Thy Father's Spirit* condensed and refocused *Hamlet*, *To Be with Hamlet* is more of a scene study, staging Act 1 Scene 5. Both productions focus on the relationship between Hamlet and his father, but *To Be with Hamlet* pare down the play to this single, crucial scene. This choice is motivated by the production's goals to facilitate an impactful encounter between the viewers and Hamlet, but it is also a concession to the technical limitations of a fully animated scene that incorporates real-time performance. Each actor's digital avatar was carefully designed and rendered, sometimes requiring additional scans of an actor's body to increase the graphical fidelity of the animated model. The addition of additional characters would increase the demands on the design team, whose budget dictated the level of detail and graphical fidelity they

could bring to the digital character models. One of the GoFundMe page's goals was to raise enough money to add fully animated faces to the digital characters. Without animated facial movements, the actor's digital avatars functioned similarly to a puppet with limited articulation rather than a 1:1 replica of an actor's body.

The limitations of the character models influence how the actors approach the challenge of remote performance. In a development diary entry from August of 2016, actor Zachary Koval describes the difficulty of performing in a virtual environment inhabited by multiple users[24]. Because the audience for whom he is performing can "be anywhere and everywhere. You need to be subtle enough to play to an audience member who is right in front of you, and also large enough for the audience member who is fifteen feet away". The actor's challenge, articulated by Koval, is to account for a wide range of audience perspectives. For Gochfield and Molina, the challenge of acting in virtual reality is to maintain the illusion of presence. Reflecting on early performances of *To Be with Hamlet*, they describe the technique of performance that developed as a mix of mask acting and puppeteering.

> On one hand, the actor must move, or the avatar appears dead. One the other hand, too much movement can cause technical problems with the tracking, and more significantly, it can appear as gross overacting...one of the keys is the fixed point - a stillness, from which deliberate movement can arise and be clearly perceived. If the mask moves too much, the audience can't connect with it. Operating a puppet is in many ways similar to mask

[24] https://vimeo.com/179789454

> performance, but it helps to animate the puppet with the subtle movement of breath. (53)

Without the delicate balance between motion and stillness, the illusion that audience members are sharing the digital stage with live performers would be shattered, and the illusion of presence compromised. *To Be with Hamlet* provides an interactive environment where the audience can adjust their perspective with ease and move freely within the confines of the digital castle ramparts.

3) *Chained: A Victorian Nightmare*

Another virtual reality performance, *Chained: A Victorian Nightmare,* uses two interactive environments, one physical and one digital, that intersect to create an immersive performance. Unlike both *Hamlet* adaptations, *Chained* allows for environmental and narrative interactivity. *Chained, A Victorian Nightmare* is a condensed, 20-minute adaptation of Charles Dickens' 1843 novella, *A Christmas Carol.* This adaptation, like *Hamlet 360: Thy Father's Spirit*, involves the viewers in the narrative and focuses the action of the performance around the viewer's perspective. Of the four performances examined in this chapter, *Chained* most resembles the trend of virtual reality "experiences" and is produced by MWM Interactive, a division of Madison Wells Media. Madison Wells Media's largest commercial output is through their film studio. Major film studio support for virtual reality projects frequently occurs in the form of movie tie-ins based on major film franchises such as Star Wars[25] and Marvel Studios' The Avengers[26], both of which are owned by media giant Disney.

[25] https://www.thevoid.com/dimensions/star-wars-vr/
[26] https://www.thevoid.com/dimensions/marvel-avengers-vr/

MWM Interactive works primarily with virtual reality. Their only recent non-virtual reality project is the 2019 video game *Creature in the Well*[27]. Their work in virtual reality spans multiple mediums and genres. *Daydreams* is a series of three "highly conceptual stereoscopic virtual reality films[28]" (sokrispymedia.com) produced by MWM Interactive that also involved a partnership with Google Daydream. *Groundhog Day: Like Father Like Son*[29] is a virtual reality video game based on the 1993 film *Groundhog Day. War Remains*[30] is an educational virtual reality simulation of a World War I battlefield that is described as an "immersive memory". (warremains.com) Each of these projects uses virtual reality within different contexts. *Chained: A Victorian Nightmare* uses virtual reality in the context of immersive theatre.

Created and directed by Justin Denton, *Chained* leans heavily into the darkest, most disturbing moments of Dickens' novella. The narrative focuses on the chilling encounters with the ghosts of past, present, and future. *Chained* puts the viewer in the place of Ebenezer Scrooge, and the ghosts interact with them directly. Unlike the casting of the viewer as the ghost in *Hamlet 350,* this role requires the viewers to be active in the scene. In performances of *Chained*, actors ask each viewer questions and then incorporate their answers into the dialogue. Bryan Bishop details the efficacy of this approach in his review of *Chained* for online tech and culture magazine *The Verge*.[31]

[27] https://creatureinthewell.com/
[28] https://www.sokrispymedia.com/daydream-vr-slate
[29] http://www.groundhogdayvr.com/
[30] https://www.warremains.com/
[31] https://www.theverge.com/2018/12/5/18124726/chained-a-victorian-nightmare-virtual-reality-justin-denton-immersive-theater

> A grisly Jacob Marley asked me what I missed most about my childhood, and I told him I missed the hope and optimism of youth, when it seemed like anything was possible. When the Spirit of Christmas Past subsequently visited me, he pointed out a pair of ghostly, shadowy children chasing each other a few feet away. The spirit leaned in close. "Look at them," he whispered, "so full of hope and potential." It's an easy trick, drawing a response out of an audience member and using that response to personalize their experience. But it worked — my own words coming back to haunt me drove home the sad longing in that scene and made it specific to my own thoughts. (theverge.com)

This narrative interactivity, where characters respond to the verbal input of the viewer is accomplished through the use of real-time actors and motion capture technology. Like in *To Be with Hamlet,* actors are fitted in motion capture suits that transcribe their movements to a digital avatar. However, *Chained* also incorporates actors in real time in the physical environment of the performance. The performance of *Chained* begins before the participant/audience member puts on the virtual reality headset.

Those who attended *Chained*'s sold-out runs in New York and Los Angeles began their experience by knocking a wolf's head knocker against an imposing wooden door. An actress opens the door and welcomes them into the physical environment of *Chained,* which contains several physical objects that will also appear in the digital environment, such as a large mirror. This mirror acts as the bridge between physical and digital. After the participant dons the headset, a skeletal

hand reaches through the mirror and drags them into the digital world of *Chained.* Bishop describes this moment, which was accompanied by the haptic feedback of an actor's hand grasping his arm.

> The owner of the bony hand was none other than Marley himself. The digital character's movements and gestures were being supplied in real-time by an actor (Michael Bates, from the LA-based immersive theatre troupe The Speakeasy Society) wearing a motion-capture rig. But Bates wasn't in some separate, standalone capture space. He was right there, playing the scene next to me, keying off my movements and vocal inflections. When Marley touched my arm, Bates actually touched my arm. When he walked up close to me, I could sense his physical presence, even while cocooned inside the headset. When the actor spoke, I heard his voice — not filtered through digital processing and piped into my ears via the headset, but because he was actually standing right next to me. (theverge.com)

In *Chained,* the digital and physical worlds coalesce to enhance the illusion of presence created in the immersive digital environment.

Creator and director of *Chained,* Justin Denton, views the performance as a type of theatre. In an interview with *Variety*, Denton clarifies how he views *Chained,* "I don't think of this as a VR experience, I think of it as an immersive theater experience that uses VR" (vareity.com). *Chained* contains several elements found in conventional theatrical performances such as the use of real time actors and a physical set. The performance lacks a conventional audience-performer

relationship however, due to it being a singular experience. Only one viewer at a time may experience *Chained*. This allows *Chained* to tell a personalized story that reacts to the input of the spectator, but does not allow for a communal experience like *To Be with Hamlet.* Executive producer of *Chained,* Ethan Stearns spoke to *Broadway World* about the target audience of the immersive performance. Stearns believes that the story and experience of *Chained* appeals to:

> anyone really in the vanguard of live entertainment. I think our target audience will mostly going to be immersive theatre and VR enthusiasts. One of the things that both immersive theatre and VR does well, it gives people a way to go into a very complex digital environment, without needing to know a lot of complex interactivity in order to experience the story. (broadwayworld.com)

Chained, like the other virtual reality performances examined in this chapter aims to offer an accessible experience, where participants do not need prior virtual reality experience, nor do they need to operate sophisticated controls inside the experience.

After *Chained* wrapped up its runs in New York and Los Angeles, it was adapted for a home release on Steam. (figure 5) While the original performances did not contain any pre-

Figure 5: A screenshot from the Steam release of *Chained: A Victorian Nightmare*. The ghost of Christmas past shows the viewer an abandoned schoolhouse. *becomechained.com*

recorded elements to allow actors to respond in real time to the participant. The home release contains the same narrative as the original interactive performances, but contains pre-recorded performances. This limits the interactivity of *Chained*, and transforms it into a distinct experience from the original performances. Like *Hamlet 360,* a spectrum of presence and interactivity is created depending on the medium through which the virtual reality performance is mediated.

4) *Elevator #7*

Another virtual reality performance that uses actors in real-time that respond to the narrative inputs of its participants is *Elevator #7. Elevator #7* is the result of the University of

Iowa's cross-departmental collaboration, "VR Club". In *Elevator #7,* a viewer-participant, or "guest" in the project's nomenclature, is ushered into the performance space by an actor playing an employee of an old hotel. The guest is greeted by "Constantine Dabrowski", the manager of the hotel, who gestures to a small wooden table in front of him. On this table sits an HTC Vive headset, a pair of noise-cancelling headphones, and vase of flowers. As Constantine begins to explain to the guest how to wear the headset, a voiceover sound cue calls him to another part of the hotel, leaving two other actors to assist the guest in donning the Vive headset and the headphones. Once the guest is immersed in the virtual environment, the two other actors and stage crew part the curtains enclosing the playing space, revealing a seated audience who will view the performance from outside the headset. This creates an asymmetrical performance that includes two distinct viewer experiences. The guest experiences the performance of *Elevator #7* from inside the digital environment, unaware that they are being viewed by the seated audience. The seated audience sees via several monitors what the guest in the Vive headset sees, as well as the elaborate choreography required to make *Elevator #7* work.

Elevator #7 premiered in December 2018 at the University of Iowa. A second round of performances were staged at The Ohio State University's Advanced Computing Center for Arts and Design (ACCAD) as part of a six-day residency. The performance was reconfigured to function in ACCAD's motion lab, a performance space that doubles as a motion-capture studio. The premiere performances of *Elevator #7* placed the seated audience along one side of a 16' x 16' square playing area. The performances at OSU reconfigured this arrangement to take advantage of the motion lab's circular curtain track, which allowed the square playing area to be encircled by curtains with the seated audience placed outside the circle. The technological needs

of *Elevator #7* require the use of space outside the acting area for cameras, props, and costume changes. As such, there is no "backstage" area, and all offstage movement and action is revealed to the seated audience, making it a component of the performance.

Playwright Alan MacVay developed the script for *Elevator #7,* balancing the artistic ambitions and technical limitations of the project to craft a story suited to a virtual reality experience. MacVay describes how the basic structure of the script evolved based on Professor of Computer Science and Technical Director of *Elevator #7* Joe Kearney's suggestion of using an elevator to easily transport participants through multiple digital environments. MacVay describes the essential experience of *Elevator #7* "...you go up [in the elevator] and you see things. Then there's a problem. You go all the way to the basement and try to solve the problem. In the original version the problem was clearly not solvable, or you thought it was solved, and then it wasn't. Then, for reasons beyond you, you get raised to the top and come out in this beautiful space." This basic framework remained through multiple iterations of the script. Over the course of script development, MacVay and Kearney discovered a particular challenge of developing a narrative for virtual reality. For many users, the "wow factor" of experiencing virtual reality for the first time overwhelmed the artistic impact of the narrative. MacVay explains, "We learned from the first time we did [*Elevator #7*] we talked with audience members later. I asked the question, 'how did the narrative and the journey of it balance with the *wow, cool* factor?' There's no questions about it, 'wow, cool' was the winner". This overwhelming response from audience members motivated changes in later drafts of the script. Speaking of the draft of the script used in the OSU residency, MacVay said, "In this version, I wanted to make the narrative and the journey better, and more tied together in a different way so that it would

have a stronger artistic effect. That depends on the disposition of the user. If they're a VR novice, or if they've had a lot of experience with VR, then that balance [between artistic impact and wow factor] might shift". With virtual reality remaining a novelty to potential audience members, theatre practitioners attempt to balance the spectacle offered by the medium with the narrative impact of the story being told.

Playwright Alan MacVay developed the script for *Elevator #7.* The OSU residency used the 19th draft of the script, which added dialogue pertaining to the mysterious butterflies that appear throughout the narrative. Due to the interactivity of the virtual environment, the script of *Elevator #7* needs to be flexible and responsive to the verbal and physical inputs of the user while telling a consistent story. Characters in *Elevator #7* ask the participant questions and ask them to complete tasks. The story requires affirmative answers and actions from the participant to proceed. This level of interactivity surpasses other virtual reality productions examined in this chapter and gives the participant-viewer a higher degree of control over their experience in the digital environment. With increased interactivity comes increased risk that the guest wearing the headset may behave unpredictably, impacting the narrative of *Elevator #7.* A resistant participant might refuse the tasks given to them by various characters, leaving the actors to improvise around this obstacle. A participant who is an experienced virtual reality user might be tempted to test the boundaries of the digital environment, looking "through" walls or crossing virtual boundaries. A guide character plays a crucial role in confining the headset wearer to the parameters of both the digital environment and the narrative. [32]

[32] I had the opportunity to view *Elevator #7* as both a guest and a seated audience member. As a guest, I knew what to expect from the performance from working on the residency before the performance date and from briefly running through a cue-to-cue of the digital environment on the Unity computer inside the headset. Despite this wealth of

The guide character welcomes the participant-viewer into the space and invites them to stand in front of a table on which sits a vase of flowers and an HTC Vive HMD. (figure 6) After

Figure 6: Constantine (center) welcomes a guest (foreground) to the Cosmos hotel. Curtains separate the guest and actors from the seated audience and will be parted once the guest's headset and headphones are securely placed. Photo © Amy Planchet

two actors help the participant-viewer put on the headset, they see a digital recreation of the wooden table. The simple wooden table with the vase of flowers that housed the HTC Vive headset serves as a connecting point between the physical and digital worlds of the Cosmos Hotel[33]. This

foreknowledge, I was quickly absorbed into the world of *Elevator #7*. The digital environment of *Elevator #7* is rendered in Unity, which requires a dedicated computer to run. Each animation in the digital environment is controlled by an operator who uses cues similarly to a conventional sound board or light board operator.

[33] The hotel was nameless in the draft of the script used for the OSU residency, but playwright Alan MacVay suggested the name "Cosmos Hotel" to establish the otherworldly tone of the performance and the name change was implemented during dress rehearsals.

eases the transition into the virtual setting, which may be unfamiliar to many participant-viewers. For VR novices, it serves as a reference point to help ease any disorientation brought about by the sudden immersion in a three-dimensional digital environment. Thematically, it reinforces the otherworldly-yet-real tone of *Elevator #7.*

Looking around the lobby, participant-viewers can see ornate gold decorative elements against bright red walls. The floor of the hotel lobby is a rich, honey-brown wood. So far, the Cosmos Hotel appears to be simply a computer-generated version of any turn-of-the-19th century luxury hotel one might find in a major U.S. city. 180 degrees behind this table, an open space where a wall should be reveals a cloudy blue sky. This open space gives the impression that the hotel lobby is many stories above the ground. This is the first indication that the Cosmos Hotel is hiding many mysteries.

Before the participant-viewer can walk over to the opening to see more of the hotel's surroundings, an actor's voice fills their headphones, informing them that the titular elevator is arriving. This prompts them to look over at the elevator doors, through which they can see Constantine riding in the elevator car as it reaches the lobby floor. *Elevator #7* relies heavily on verbal cues from the actors to guide the guest safely around the digital environment. This approach allows *Elevator #7* to incorporate pseudo scene transitions. Unlike *Hamlet 360,* these scene transitions are under the viewer's control and therefore do not seem jarring.

The boundaries of *Elevator #7's* digital environment are defined by two sensors placed on opposite corners of the 12' x 12' playing area. If a guest were to step outside this boundary, visual glitches would break the immersion of the digital environment. To keep the guest within the boundaries of the playing space while maintaining the sense of exploration afforded by virtual

reality requires the actors to deliver in-character instructions and gentle corrections to the guest. Constantine is responsible for most of these verbal cues. Constantine's role as tour guide required the actor, Joe Osheroff, to adapt quickly to unexpected issues such as snagged microphone wires or a guest almost colliding with a piece of equipment, all while staying in character.

After the elevator doors open, Constantine invites the guest to step into the elevator. The HTC Vive's tracking capabilities allow them to locomote through the space using only physical movements. After stepping inside the elevator, the guest can turn to see Constantine standing next to them, his image streamed into the digital environment via a depth-sensing camera[34].

Elevator #7 uses two depth-sensing cameras to stream video of actors performing in real-time into the digital environment. This allows for actors to be present in both the virtual and physical environments of *Elevator #7* simultaneously. The depth sensing helps lessen the flat appearance of the real-time video, but the effect is not perfect. The edges around the actor become pixelated when the actor moves, and the video imaging looks flat when viewed from specific angles. The graphical fidelity of this video representation is fairly low. However, this approach effectively allows the guest and performers to share the same digital space. The real-time video also allows the guest to see the facial expressions and small gestures of the performers. This approach contrasts with the technique used by other virtual reality projects that incorporate real-time performance. For example, *To Be with Hamlet* uses motion capture and digital avatars,

[34] During my experience as a guest in *Elevator #7,* I found that the digital elevator created a convincing sense of confinement. Although I knew that the elevator in the physical space is simply a 4' x 5' rectangle marked on the stage floor with tape, I felt almost claustrophobic.

which limits the range of subtle motion the actors can portray. *To Be with Hamlet*'s approach allows the real-time representation of the performers to share a visual language with the digital environment. *Elevator #7*'s solution causes a visual clash between the virtual hotel and its human occupants but allows for subtle acting choices. (figure 7)

Figure 7: Constantine (Joe Osheroff) appears to ride inside the elevator with a guest. A boundary of black pixels appears around Osheroff's frame. Photo © Amy Planchet

After stepping into the elevator, Constantine asks the guest if they would like to take a tour of the hotel. He informs them that the hotel has 47 floors, "and each floor is a world unto itself" (MacVay 3). As the elevator heads up towards the 14th floor, guests can see through the doors of the elevator a room that looks like a study, and then on the next floor, that same room but upside

down. The elevator passes these rooms quickly, giving the guests little time to process this strange occurrence. Constantine halts the elevator on a floor that looks like an arid grassland. He invites the guest to step outside the elevator onto the Savannah, where they are greeted by a blast of hot air.

This is the first of several instances where haptic feedback is created by creating a physical sensation that matches the digital environment. This instance of haptic feedback is created by an actor holding a small portable heater a few feet away from the guest's body.[35] Constantine asks the guest if they can see an elephant to their left, and a sound cue of an elephant's trumpet prompts the guest to search for it. There is no elephant, and when the guest turns their head back to face forward, they see another actor in front of them, wearing a straw hat and tan jacket. The elephant sound effect is used to disguise the transition between the actor playing Constantine and Jess Cavender, the actor playing Lesley the lepidopterist. Cavender stands in front of the same camera used by Osheroff, which projects her image in a different area of the digital environment. For the transition between the two actors to work, the guest cannot be looking at Constantine or at the spot

[35] As a guest, I found these moments of haptic feedback surprising and convincing, even though I knew exactly when and how there were incorporated into the experience due to my work on the project. The small space heater used in the Savannah produced warm air that was diffused enough to create the illusion that the heat emanated from the environment, rather than a single source. The guests' headphones concealed the sound of the space heater's fan.

where the lepidopterist will appear. This transition, and others like it that occur throughout *Elevator #7* rely on the guest's willingness to follow suggestions offered by Constantine and other actors and respond to audio cues. (figure 8)

Figure 8: Lesley (Jess Cavender, ACCAD Production Manager) waves to a guest, who waves back to her. Monitors display the view from inside the guest's headset to the production team and the seated audience. Cavender's performance is directed at a depth-sensing camera, allowing her image to be streamed into the digital environment in real time. Alex Olisewski holds a space heater to simulate desert heat, while Joe Kearney (UI VR Lab Unity Developer) follows the guest around the performance space, keeping the HTC Vive headset wires from distracting the guest. Photo © Amy Planchet

The new actor introduces herself as Lesley, the butterfly expert. She asks the guest if they have seen any small, green butterflies nearby. This same actress first appeared in the physical representation of the Cosmos Hotel reading a magazine with a green butterfly on the cover, which creates another connection between the two environments of *Elevator #7.* After the guest responds

in the negative, she gestures to another point outside their field of vision, exclaiming that she can see a butterfly. This prompts the guest to look in the direction Lesley is pointing, giving the actress time to quickly move away from the camera while Constantine takes her place. Although both characters stand in front of the same camera, their images are placed in different areas of the digital environment. As Lesley the lepidopterist dashes out of sight, she implores the guest to keep searching for the butterflies and contact her if they see any. This alerts them to the importance of the butterflies in the narrative of the performance. It also gives the guest a task, which helps prepare them for the active role they will take in the latter half of the narrative. Constantine, now visible, beckons the guest back into the elevator car, and the elevator continues upwards. The next floor consists of a vast ocean and a fully rigged sailing ship. The ship's cannons sat at the guests' eye level, while the sails tower above. After the elevator doors slide open, the guest is met with a mist of ocean spray, provided by an actor armed with a spray bottle.

During the series of performances at ACAAD, this second instance of haptic feedback frequently elicited surprised laughter from guests. The digital ocean water surrounded the elevator on all sides. Many guests peered out over the threshold of the elevator but were hesitant to move forward.[36] After a moment, a sailor appears on the deck of the ship. The sailor, played by Alex Oliszewski, roped into double duty as actor and ACCAD host, tells the guest about his quest for a beautiful flower called a frangipani[37]. The botanist-sailor asks the guest if they would like one of these flowers, should he find them. If the guest answers in the affirmative, the sailor asks them for

[36] When I got to this floor, I peered out over the threshold of the elevator, hesitant to step out onto what I knew objectively was the solid floor of the motion lab, but what my visual cortex was telling me was the surface of a vast body of water. This was the strongest feeling of mind-body conflict I experienced during *Elevator #7.*

[37] Only one guest I observed on performance day recognized the name of the flower as a reference to the musical *South Pacific*

their mailing address. The flower, like the mysterious butterfly, is a key visual and narrative motif of *Elevator #7.* If the guest hesitates, the sailor must improvise a way to advance the script and offer to send the guest a flower even if they do not immediately accept his offer. This interaction between the guest and the sailor character tests the participant-viewer's test in the performance. Each person answered in the affirmative when asked if they would like a flower sent to them, but many were reluctant to give out their personal information.

On the next floor, the elevator opened on a starry night sky, with a full moon in the distance. Here, as with the floor housing the ocean and ship, guests choose to lean out over the threshold of the elevator door rather than step out into the illusory endless void of space. This interlude provided a moment of stillness before the titular elevator breaks down. After the doors close on the moon floor and the elevator proceeds upwards towards the 14th floor, the elevator grinds to an abrupt halt. This is represented by an effect in Unity that briefly shakes the digital environment while an actor gently taps the guest's back with a piece of plywood. This moment of haptic feedback was effective, inducing a sense of physical peril where the physical and digital worlds collide. This moment elicited the strongest response from guests, with several people shouting in surprise. After a second shudder, the elevator plunges downward while an alarm rings.

The previous floors flash past the elevator doors, and a blast of wind provided by a fan placed below the guest's face creates the illusion of falling through an elevator shaft. The elevator falls past the lobby and slows to a stop. The doors slide open to reveal a dark stone room. The sound effect of an echoing drip of water creates a dank atmosphere. The guest has reached the basement of the hotel. After giving them a moment to take in their new surroundings, Constantine asks for the guest's help. They are tasked with searching for a circuit breaker which will

presumably restore power to the elevator. First, the guest must put on a pair of rubber boots to avoid the wet floor. The sprung floor of ACAAD's motion lab is not wet, but for some guests, the impact of the dripping water sound effect was powerful enough that they responded to Constantine that they could feel how damp the floor was. Constantine directs the guest to a folding chair and a pair of yellow rain boots sitting in the middle of the basement. (figure 9) Via a pair of sensors

Figure 9: A guest successfully locates and puts on a pair of rain boots. The black HTC Vive sensors are visible on top of the boots. The folding chair also has a sensor attached, not visible in this photo. A tripod houses another sensor that reads the positioning of the Vive headset and other sensors within the playing space. Photo © Amy Planchet

attached to a physical pair of yellow rubber boots, and another sensor placed under a brown folding chair, these physical objects appear simultaneously in the digital environment.

This moment requires the physical and digital environments to align. If these props that live in both the physical and digital environments of *Elevator #7* do not convincingly occupy the same temporal space, the digital illusion will break. During the many back-to-back performances at OSU, this happened several times. The rubber boots were the least reliable technical element of *Elevator #7.* The alignment of the boots was frequently askew, leaving guests grasping in vain for a digital object whose physical presence did not correspond with the visual information they were supplied. Although the rubber boots were a troublesome technical challenge, when they worked, they served to give the guest a sense of physical presence in the digital environment, a simple representation of their embodiment. In this narrative sequence of *Elevator #7*, guests are prompted to navigate the digital environment in a task-oriented rather than exploratory manner. The boots, physical and digital, served to ground them in the digital world as they undertake these tasks.

After pulling on the rubber boots, the guest begins to search the basement for a circuit breaker. A quick glance reveals a window above eye level covered with iron bars, a rudimentary furnace, and a set of wooden stairs leading out of the basement. After searching in vain for a circuit breaker, a small round panel on the floor slides open. Peering down this hole, the guest sees the botanist, trapped in a cage under the basement floor. He tells the guest that his boat sank before he could reach the South Pacific. He then passes his task of finding the flower to the guest before unseen forces cause the floor panel to close over him again.

The real-time video of the trapped botanist is shot from a high angle using a second depth-sensing camera. This allows the guest in the hotel's basement to tower over the botanist, playing

with scale. Many guests knelt down to the floor or bent over at the waist to get closer to him. Before the floor panel closes, the botanist suggests that the guest search near the furnace. After the floor closes over the distressed man, the guest is met with an eerie silence, broken by the steady drip of a leaky water pipe.

Looking back around the room, guests locate the furnace in a corner of the room. Reaching for it with outstretched hands, they can feel heat emanating from the digital fire. This blast of heat is provided by the same space heater that created the arid atmosphere in the Savannah. Finding nothing resembling a circuit breaker, the guest must continue to glance around the basement, and they spot the butterfly expert again. Lesley seems surprised to find the guest in the basement and tells them that the butterflies led her there. She again asks the guest if they have seen any butterflies. She seems distressed and speculates that something terrible has happened to them. This adds to the mounting sense of danger and confusion that builds throughout this sequence. The butterfly expert again asks the guest to keep searching for the butterflies.

At this point in the experience, many guests became frustrated. They were now burdened with three tasks with no clear way to accomplish them and had appeared to exhaust all possible locations in the search for a circuit breaker. The script anticipated this point of frustration, so Lesley prompts the guest to look towards the top of the stairs, which is blocked by a gold and blue stanchion to discourage guests from trying to climb the stairs, which would lead them out of the playing area and break the immersion of the environment. The guest walks over to the bottom of the staircase as prompted and looks up towards the open night sky. After a moment of silence, flower petals begin to fall from the sky accompanied by the first verse of “Goodnight my

Someone" from *The Music Man*[38]. As these digital petals slowly fall, an actor throws handfuls of prop flower petals over the guest's head. This placid moment broke the tension of the fruitless search for flowers, butterflies, and circuit breakers.[39] Many guests encountering this moment held out their hands or tried to grab petals out of the air.

This moment of play successfully united the digital and physical environments but may have inadvertently deprioritized the narrative connection to flowers. Guests were transfixed by the physical sensation of flower petals falling on them while digital petals streamed past their eyes, but only one asked if the petals were from the frangipani flower they were tasked with recovering. In an interview[40], Dan Fine expressed his concern that the "Wow factor" of virtual reality distracts from narrative and performance. This has a stronger potential to occur for guests who are VR novices.

After this whimsical shower of flower petals, eerie silence returns. During this silence, many guests continued to look around for any indication of what they should do next. After what feels like a long time, multicolored butterflies begin pouring in through the barred window. The flock streamed towards the open elevator. This is accompanied by a swell of music. Some guests, having just grasped flower petals in their hands, reached for the butterflies, expecting haptic feedback. Constantine prompts the guest to "step into the elevator and follow the butterflies". (MacVay 8) Once inside, the elevator doors close, and the car rises quickly past the previously

[38] *The Music Man* is the second stage musical referenced in *Elevator #7,* the first being *South Pacific*

[39] When I encountered this moment for the first time in the cue-to-cue run, this was the only instance of haptic feedback. It was unexpected, and I couldn't help but burst out laughing in surprise and delight. I held my hands out and let the petals fall past them.

[40] Peterson, Anne Cordelia. "Interview with Dan Fine." 7 Feb. 2020.

explored floors. The doors finally open on a brightly colored meadow. When the guest steps out of the elevator they are greeted by a gentle breeze and a floral scent. An actor provided this atmospheric effect by holding up the same fan used to heighten the sense of danger in the falling elevator and spraying a scent spray through the fan blades. A swelling musical underscoring continues as the butterflies stream out the door of the elevator.

While the vibrant color pallet of the meadow contrasted sharply with the dreary basement, there is still a sense of uncertainty in this new environment. Fixing the elevator is no longer a concern for the guest, but there are narrative threads that still need to be resolved. Some guests looked around at the wildflowers in the meadow and began to walk towards them, trying to complete the task of finding the frangipani. After several moments of stillness, a huge white flower crests the horizon and slowly begins to rise into view. This giant flower is attached to a red, white and gold door frame. As the door frame and flower came into view over the horizon, a staircase appeared leading up to the door. The steps rose out of the ground. Many guests instinctively stepped up onto the bottom step. Some attempted to climb the staircase, but Constantine gently prompted them to stand still, and let the stairs carry them towards the door.

The escalator transports the stationary guest towards the gold doorframe, while the music swells, and butterflies follow. After passing through the arch, the guest is abruptly transported back to the lobby of the Cosmos Hotel. The swell of music stops suddenly, and the gentle lobby music returns. As the guest adjusts to their new surroundings, Constantine asked, “So, how was your tour?”. *Elevator #7* ends on a question, inviting the guest to reflect of their experience. The other actors then help the guest out of their head mounted display and headphones, easing them out of the virtual environment.

The narrative and atmosphere of *Elevator #7* is based on a dream had by playwright Alan MacVay. An elevator was not part of his original dream but was chosen due to the limitations of the medium. An elevator allows the guest to explore multiple separate environments without disruptive transitions or use of controllers to teleport around the environment. Of the virtual reality performances examined in this chapter, it is the only one that creates an asymmetrical audience experience. A conventional configuration of a theatre audience watches the narrative and non-narrative elements of *Elevator #7* as an intricate performance. In this configuration, a conventional understanding of "liveness" is present. The seated audience members share temporal space with performers. However, the actors' performances are directed not at this seated audience, but at the guest. The guest unknowingly performs for this conventional audience, but the actor's actions are directed at the guest wearing the headset.

Each of these virtual reality performances engage the concepts relating to liveness in distinct ways. Between these four performances, there is a spectrum of interactivity, where liveness is located in the responsiveness of the performance to audience input. At one end of this spectrum is the interactivity inherent in the medium of virtual reality, where the spectator interacts with the filmed or digital environment through controlling the camera. Interactivity is enhanced in both *Chained: A Victorian Nightmare* and *Elevator #7* when the digital and physical environments respond to input from the spectator, such as picking up an apple in *Chained,* or putting on a pair of rubber boots in *Elevator #7.* Both of these projects also prioritize narrative interactivity, where actors respond to the words and actions of the audience-participant. These two performances also enhance the illusion of presence created in virtual reality through implementation of haptic feedback provided by actors in real time. Each of the projects creates an audience-performer

relationship that is distinct from a conventional theatrical performance. While the equipment that enables headset-based virtual reality is isolating by design, *To Be with Hamlet* and *Elevator #7* create a communal experience despite the limitations of VR hardware. Liveness is identified as an important aspect of each of these performances, but the form that liveness takes varies.

Chapter Four: The Boundaries and Limitations of the Hybrid Virtual Reality Theatre

The previous chapter detailed four performances from within the past three years that could be classified as hybrid virtual reality theatre. This chapter will explore and analyze the boundaries and limitations of the hybrid virtual reality theatre. Some of the limitations of this hybrid medium are inherent to the technology of headset-based virtual reality. Other limitations are particular to performance. The primary limitation of the VR headset is financial and physical accessibility.

With their emphasis on visual stimuli, virtual reality headsets are inaccessible to people with vision impairments. The viewing distance between the screens of the headset and the eyes of the viewer is large enough that farsighted users and severely nearsighted users cannot see the images within the headset clearly.[41] This compromises the illusion of depth created by the virtual reality headset because every object on screen is equally out of focus, regardless of their supposed distance from the viewer.

A common issue with virtual reality headsets is motion sickness or "VR sickness". University of Minnesota kinesthesiologist Thomas Stoffgren estimates that "With contemporary commercially available VR systems, the incidence of motion sickness after only 15 minutes is

[41] My own nearsightedness (corrected via -5 prescription lenses) prevents me from seeing clearly in a head-mounted display unless I wear my glasses. Fortunately, when participating in *Elevator #7*, myself and other guests were able to wear glasses inside the HTC Vive HMD. Some styles of frames may not fit comfortably inside the HMD, and several guests elected to not wear glasses while participating in *Elevator #7* to have a more comfortable experience.

anywhere from 40 to 70 percent" (quoted by Kim, Meeri, *Inside Science*).[42] The causes of VR sickness are not certain, but two theories were explored by Michael E. McCauly and Thomas J. Sharkey in a 1992 paper titled *Cybersickness: Perception of Self-Motion in Virtual Environments.* McCauly and Sharkey point to sensory conflict theory and the poison hypothesis as possible explanations for this phenomenon. Sensory conflict theory proposes that the dissonance between the user's stationary body and the motion in the virtual environment causes nausea. The poison hypothesis speculates that the body processes the visual information provided by virtual reality as a hallucination brought on by ingesting a foreign substance. Nausea and vomiting are attempts by the body to expel the foreign substance. Regardless of its cause, VR sickness is a serious obstacle to more widespread adaptation of the technology, and a barrier to accessibility for current users.

Another troubling aspect of this barrier to accessibility is the way in which VR sickness impacts women at a higher rate than men. A 2017 study using a popular commercially available VR headset[43] by Daniel M. Shafer, Corey P. Carbonara, and Michael F. Korpi found that in two different testing scenarios, female VR users in each group reported a higher rate of VR sickness than male users. While the underlying causes for VR sickness are uncertain, the reason for the sex disparity in its presentation may be traced back to headset design. Researchers Jaqueline M. Fulvio, Mohan Ji, and Bas Rokers at the University of Wisconsin - Madison claim that female users experience VR sickness more frequently than male users because female users have, on average, a narrower interpupillary distance than male users.

[42] https://abcnews.go.com/Technology/feel-motion-sickness-virtual-reality/story?id=65153805

[43] The study used two generations of the Oculus Rift, the DK-1 and the DK-2, but found no significant difference between the two generations of headsets

Interpupillary distance is a measurement of the distance between the pupils and is vital for properly fitting eyeglasses and also impacts how viewers process the visual information provided by a VR headset. Virtual reality headsets are calibrated to fit a statistically average male interpupillary distance, which is too wide for approximately 90% of female users, according to Rokers et al. Many advanced headsets have adjustable interpupillary distance, but still do not fit comfortably for a wide range of female users. This means that virtual reality headsets contain an innate sex disparity. Sex discrimination, intentional or not, is baked into the hardware. If this disparity goes unaddressed and unacknowledged, the supposed cutting edge of performance technology will be based on an assumption of the male user as default, and therefore as a privileged, user.

The studies cited above did not consider how age impacts the accessibility of virtual reality headsets. The subjects of both studies were adults. Virtual reality headsets are designed primarily for adult users. Children with smaller head measurements and smaller interpupillary distances are not served by current commercially available VR headsets. Not only does this exclude children from accessing content in VR, it limits the potential audience for virtual reality performances. If a younger audience is excluded due to hardware limitations, it has the potential to impact the type of content produced for this platform, leading to an adult-centric and male-centric platform. Overestimating the accessibility of virtual reality due to the commercial availability of hardware ignores the underlying barrier to entry for women and children.

Another barrier to accessibility particular to virtual reality headsets is financial. Only one of the performances examined in the previous chapter, *Hamlet 360: Thy Father's Spirit* can run on a smartphone housed inside a headset. This is the most affordable headset option. Google

cardboard headsets retail for as little as $15. However, this low price point does not factor in the cost of a compatible smartphone. The official recommendation from Google, a principal sponsor of *Hamlet 360*, is the company's flagship phone, the Google Pixel. The Pixel retails starting at $799 USD[44], with a larger capacity model starting at $999 USD.

Smartphone usage is ubiquitous, with the PEW Research Center estimating in 2019 that 81% of adult Americans owned a smartphone.[45] However, smartphone ownership is less prolific in rural communities than in urban communities. Demographics of people who are less likely to have access to a smartphone include people without a high school degree or higher, people living under the poverty line, and adults over 65 years old. PEW does not provide statistics for smartphone ownership for children and teenagers, but a 2019 survey[46] by Common Sense Media[47] cited in an NPR article about childhood smartphone usage[48] claims that almost half of American children own a smartphone by the age of 11. Usage and access are impacted by similar demographic differences as adults, including socio-economic class. Before making the assumption that a $15 cardboard headset is accessible to most people, the hidden costs must be considered.

These hidden costs do not impact all potential viewers equally. The director of *Hamlet 360,* Steve Maler, sees virtual reality as a potential educational tool, which could be used to bring Shakespeare into the classroom. Cheap headsets like the Google Cardboard may offer an alternative to attending a conventional live Shakespeare performance for students who live long distances from a theatre or performing arts venue. However, these students are more likely to have

[44] https://store.google.com/us/category/phones Prices at time of writing
[45] https://www.pewresearch.org/internet/fact-sheet/mobile/
[46] https://www.commonsensemedia.org/research/the-common-sense-census-media-use-by-tweens-and-teens-2019
[47] Common Sense Media is a non-profit organization that specializes in providing "education and technology recommendations for families and schools"
[48] https://www.npr.org/2019/10/31/774838891/its-a-smartphone-life-more-than-half-of-u-s-children-now-have-one

barriers to smartphone accessibility than students who live near urban centers with access to conventional live performances.

The other three performances require a headset such as the Oculus Rift or HTC Vive. *Elevator #7* only works with the HTC Vive because it tracks the participant's body in space and uses sensors to replicate physical objects in the digital world. *To Be with Hamlet* was also developed for the HTC Vive. Both of these commercially-available headsets require a compatible personal computer or laptop to run required software. The Oculus Rift S[49] costs $399 USD, with a recommended compatible personal computer or laptop ranging from $829 - $3,571 USD[50]. The HTC Vive, the system for which both *Elevator #7* and *To Be with Hamlet* were developed, ranges in price from $599 for only the head mounted display to $1,199 for a full kit that includes sensors and controllers[51]. Neither of these price points reflect the cost of the personal computer needed to run software for the Vive. A project like *Elevator #7* that do not sell tickets for performances shoulder the cost of development and hardware. The other three projects detailed in the previous chapter have a version of their performance available to a home audience. *Hamlet 360* was designed for home users. *To Be with Hamlet* was and scheduled for a home release after its festival performances. The adapted version of *Chained: A Victorian Nightmare* is available to purchase for $5.99 USD[52] on Steam. Although *Chained* is priced reasonably, it requires either the Vive or

[49] https://www.oculus.com/rift-s/ The Oculus Rift S is the second-generation of the Facebook-owned company's Rift headset. It was released in March 2019. One major upgrade to this generation was the ability of the headset to provide room-scale VR without the need for external sensors. This innovation would potentially cut down the initial buy-in cost for experiences like *To Be With Hamlet* that require room-scaling, but was released long after development for this project ended.

[50] https://www.oculus.com/rift-s/oculus-ready-pcs/#pc-offers The Oculus website includes a list of PC requirements to run the Oculus, but has stopped updating the list. This encourages consumers who are less tech-savvy to purchase a computer from the list of official recommendations rather than attempt to build a more affordable option themselves.

[51] https://www.vive.com/us/product/vive-pro-full-kit/

[52] https://store.steampowered.com/app/1198700/Chained_A_Victorian_Nightmare/

Oculus systems to run. Like the gender gap in VR Sickness, the financial barrier to headset accessibility should not be ignored, as it risks entrenching biases and barriers into the platform itself.

Although the projects explored in the previous chapter share similarities in their approach to performing in virtual reality, uncertainty remains in how to classify this type of performance. Various media outlets covering or promoting the same project reference different genres and mediums, attempting to find a suitable classification for the virtual reality performance. *Hamlet 360: Thy Father's Spirit* vacillates between mediums in news articles and reviews of the performance. Sofia Barrell, writing for *American Theatre* magazine, calls *Hamlet 360* a "new immersive theatre experience" (americantheatre.org). Elizabeth A. Harris, reviewing the project for *The New York Times*, refers to *Hamlet 360* as a film, but then she elaborates that, "although you watch it on a screen, 'Hamlet 360' feels in many ways more like theater than cinema" (nytimes.com). The artistic director of the Commonwealth Shakespeare Company, Steve Maler, sees virtual reality as a new medium, which combines characteristics and techniques from both cinema and live theatre. He sees virtual reality as a natural fit for theatre-makers, who prioritize the connection between actor and audience that can be facilitated in virtual reality. Maler claims that

> The possibilities as a new medium are really exciting, and I think theatre practitioners are uniquely positioned to be successful in this medium—we understand this notion of sustained performance, the immediacy and intimacy you can build with an audience over the arc of a performance. I think there's a really

> exciting landscape ahead for theatremakers utilizing this medium. (americantheatre.org).

Maler calls virtual reality a "new medium" in which theatre professionals could thrive due to theatre's interest in meaningfully building a connection between the audience and the performer. He sees virtual reality as a medium that forges a strong connection between the viewer and performer due to the immersive virtual environment.

Despite Maler's confidence in theatre being well-suited to adapt virtual reality, uncertainty remains about this medium's ontological relationship to cinema and theatre. The Commonwealth Shakespeare Company's website straddles film and theatre language when they promote the project as a "cinematic, 360-degree adaptation that explores new dimensions of the medium by casting the viewer as the Ghost of Hamlet's dead father, giving the viewer a sense of agency and urgency as an omniscient observer, guide and participant" (commshakes.org). The agency of the viewer-participant is limited compared to other performances such as *Elevator #7* and *Chained,* where actors respond to the input of the participant-viewer in real time and objects in the digital environment may be manipulated. *Hamlet 360*, composed entirely of pre-recorded elements, is limited in the ways in which it can be considered a conventionally live performance. If the live is that which cannot be repeated, the liveness of *Hamlet 360* is located in the participant-viewer, rather than the performance itself. Interactivity in this performance is also limited and situated entirely in the viewer-participant.

The varying language used in promoting and reviewing *Hamlet 360* demonstrates an ontological uncertainty surrounding performance in virtual reality. The viewer's control over the

camera distinguishes *Hamlet 360* from conventional cinema, but its lack of real-time elements and a communal audience experience distinguish it from conventional theatre. Hybridity allows for the representation of multiple performance practices and mediums present in the performance. *Hamlet 360* is used as an example of hybrid virtual reality theatre because it is significantly different from conventional cinema and prioritizes an audience/viewer-performer relationship typically facilitated through live performance. It forms the low end of the spectrum of interactivity used as an alternative to a conventional definition of liveness in the hybrid virtual reality theatre. The head mounted display provides a sense of presence distinct to virtual reality used in *Hamlet 360* to cast the viewer in the play, directing many direct addresses to the viewer. In this example, the hybrid virtual reality theatre is defined by features that distinguish it from conventional cinema, primarily the viewer's control over the camera.

The viewer's control over the camera not only creates interactivity, but it also helps clarify the ontological murkiness of *Hamlet 360.* In *Theatre and Performance in Digital Culture: From Simulation to Embeddedness,* Matthew Causey examines televisual and mediated elements in live performance, and their impact on what qualifies as "live" performance. Causey poses several critical questions in his book, asking

> if the ontology or essence of performance is its orbiting disappearance which resists the technology of reproduction, what takes place upon the collision of the televisual, which keeps appearing/picturing, and the performative which employs an aesthetics of dematerialization? How does the maniacally regenerating *now* of performance interact with the

> reproducible flow of the televisual and its economy/circulation of representation? (31)

Hamlet 360, with its panoptic camera, complicates this distinction between the televisual and the "now" of performance. The performance is pre-recorded, and thus, repeatable, but the movable perspective of the 360-degree camera means that the performance will not repeat in the same manner for each spectator. The performance regenerates with each viewing based on the kinesthetic influence of the headset user.

This feature distinguishes *Hamlet 360* from conventional cinema but does not set it apart entirely from the hybrid medium of virtual reality cinema. However, the performance employs theatrical performance practices and scenography. The Commonwealth Shakespeare Company sought cast members who had experience with both stage acting and television acting. Jack Cutmore-Scott, who plays Hamlet, describes how a theatrical approach to acting techniques allowed the cast of *Hamlet 360* to treat the panoptic camera like a fellow cast member as they navigate the 360-degree set. Cutmore-Scott explains the process as follows:

> We established that relationship [to the camera] in the same way you would a play, so that on the day it felt a little less unnatural than it might've done talking to the lens… [the experience] felt different because of the 360-degree nature of the set. The set encapsulates the camera, so it felt a little like a person - like something more than staring into the black hole of a conventional camera". (americantheatre.org)

The makers of *To Be with Hamlet* use more direct language to categorize their ambitious project. *To Be with Hamlet*'s official website calls it "a live theatre performance in Virtual Reality that allows anybody anywhere to have an intimate experience with *Hamlet*, Shakespeare's dramatic masterpiece" (hamletvr.org). Director David Gochfield sees *To Be with Hamlet* as live theatre that uses the medium of virtual reality to replace a conventional stage. In the press kit for *To Be with Hamlet*, he explains how the project differs from other artistic mediums most commonly associated with virtual reality.

> Most of the practitioners working in narrative VR today approach it as an extension of film or video games. But I believe storytelling in VR is closer to the art of theater. In theater we create a fictional world that attains a feeling of reality through the physical presence of live performers and scenic elements, and the illusion of place presented on the stage is an essential element of the power of theatrical storytelling. Theater has always experimented with new ways of creating that sense of place, ranging from un- canny verisimilitude to minimal suggestions that engage the audience's imagination more actively. (Gochfield et. al 3)

For Gochfield, the illusion of place created by theatrical scenography, can be effectively created in VR. He specifically notes that it is storytelling that provides the similarities between virtual reality and theatre's illusion of space. The manner in which narrative is presented in *To Be with*

Hamlet distinguishes it from both named examples of cinema and video games. Marie-Laurie Ryan analyses ways of constructing interactive narratives in *From Narrative Games to Playable Stories: Toward a Poetics of Interactive Narrative.* According to Ryan,

> While narrativity is a type of meaning, interactivity, when put in the service of entertainment, is a type of play. The combination of narrativity and interactivity oscillates between two forms: the *narrative game,* in which narrative meaning is subordinated to the player's actions, and the *playable story,* in which the player's actions are subordinated to narrative meaning. (45)

Ryan uses these terms to analyze video games, and they are useful to distinguish the storytelling in *To Be with Hamlet* from these two types of narrative in video games. Of the two categories, the virtual reality performance of *To Be with Hamlet* most fits within the label of a "playable story", where the narrative takes precedence over the player's actions and agency. In *To Be with Hamlet,* the viewer-participants may freely move around the digital environment, giving them control over their viewing experience. However, the scene performed by the actors in real-time does not adjust to the actions or position of the audience-participant. With multiple people able to view *To Be with Hamlet* simultaneously, the actions of an individual audience member within the digital environment do not impact the story. The interactive narrative of a virtual reality performance is distinct from a playable story as described by Ryan because the narrative can and will progress without any input from a "player", or in the case of *To Be with Hamlet,* an audience member.

Like *To Be with Hamlet,* both *Chained* and *Elevator #7* resemble a playable story, but remain distinct from virtual reality video games that prioritize narrative over interactivity. Both *Chained* and *Elevator #7* allow for improvisation that slightly molds dialogue to react to the viewer-participant's verbal and physical input. However, the story told through the performance does not significantly change based on the viewer-participant's input. Although the viewer-participant cannot significantly alter the course of the narrative, they play a larger role in the performances of *Elevator #7* and *Chained* than the audience members of *To Be with Hamlet.* These performances illustrate another characteristic of the hybrid virtual reality theatre that is related to interactivity: the audience-performer relationship.

The viewer-performer relationship is a key element of theatre and is prioritized in hybrid virtual reality theatre performances. In *Chained: A Victorian Nightmare*, the viewer-performer fluctuates in intimacy and responsiveness depending on how the performance is accessed. With interactive elements in both the physical and digital world of *Chained,* the viewer-participant's sense of being present in the digital world is enhanced. When a digital avatar of a performer stands next to them, the viewer-participant feels a real hand rest on their shoulder. In this performance, the illusion of presence is reinforced by the physical environment. In *Virtual Theatres* Gabriella Giannachi describes how in virtual reality, it is difficult to distinguish between the "real" and the virtual.

> When immersed in virtual reality, the user is not presented with a copy or imitation of the real, but rather with something that has its own ontological status. Because this virtual world is not a representation of the real, it must be a part of it. And yet the virtual

> is not simply synonymous with the real. While it is a part of the real, it does not coincide with it… This paradox, which explains virtual reality's unstable ontological status, allows for the creation of an art form that both utilizes and subverts canonical conceptions of 'realness', 'realism' and even 'real'. (131)

The "unstable ontological status" of virtual reality allows performances like *Chained* to borrow elements from immersive and conventional theatre and place them in a new artform. It plays with the "real" and the virtual by creating specific moments where the two worlds intersect.

In the original run of the performance, viewer-participants experienced a performance tailored to their responses to personal questions, interact with objects in the environment, and receive haptic feedback from performers physically interacting with them. In the commercially available version of the performance, these moments of connection between real-time performer and audience-participant are absent. This adapted version of *Chained* retains the intimacy and viewer-participant-focused narrative of the original. This performance provides an example of how the viewer-performer relationship shifts depending on the presence of real-time performers. Even in the commercially available adaptation, the action and visuals center on the viewer-participant.

Elevator #7 contains multiple audience-performer relationships. The conventional, seated audience shares a communal viewing experience, while the viewer-participant, or "guest" interacts directly with the performers and the digital environment. Although the seated audience's experience most closely aligns with a conventional live performance, the guest's unconventional experience within the digital environment is prioritized. The seated audience can view the action of *Elevator #7,* but the actors do not direct their performance towards them. The presence of a

seated audience does not pull the performers' focus away from the guest wearing the head-mounted display.

In the hybrid virtual reality theatre, the viewer-performer relationship maintains a singular focus on the viewer-participant wearing the head-mounted display that encloses them in a 360-degree environment. This environment may be shared with performers in real-time or may contain pre-recorded performances. Unlike conventional live theatre, the hybrid virtual reality theatre does not stratify its audience based on ticket price, delivering a vastly different experience to those in the front row compared to balcony seats. The head-mounted display of a virtual reality console places each audience-participant at the center of the action. In a performance like *To Be with Hamlet,* where multiple head-mounted display wearing people can occupy the same digital environment, audience-participants are given the agency to move throughout the digital ramparts of Elsinore Castle, freely choosing their viewing angle and position relative to the performers. The agency of the viewer-participant distinguishes hybrid virtual reality theatre from both conventional theatre and cinema. Due to the demands of virtual reality, the viewer-participant perspective is necessary to consider at all points of development and rehearsal. The medium of virtual reality fosters an intimacy between performer and viewer-participant that theatrical storytelling and aesthetics enhance.

While the specific language used to describe theatrical performances that use virtual reality varies, each of the four projects examined in this project share common characteristics. These characteristics of interactivity, presence, and a prioritized performer-spectator relationship distinguish hybrid virtual reality theatre. The interactive digital environment allows the performance to regenerate based on the input of a viewer. The illusion of presence pursues the

theatrical “magic” of shared space in a digital context, which allows presence to occur regardless of distance.

Chapter Five: Theatrical Performance Goes Virtual During the COVID-19 Pandemic

The previous chapter explored the characteristics of hybrid virtual reality theatre as well as some limitations of this hybrid medium. With these limitations in mind, this chapter will discuss a) the potential of theatrical performance in virtual reality, as theatre evolves in a technologically saturated culture, and b) the potential of the hybrid virtual reality theatre in the context of a global pandemic, as conventional live performance is no longer deemed sanitary and safe for both the production teams and the audiences.

Among those working in the intersection of theatre and virtual reality, the outlook on the potential of the hybrid virtual reality theatre is mixed. Creative director of *Elevator #7,* Dan Fine was skeptical of head-mounted displays, expressing concern that the platform may have unforeseen long-term consequences for users. In an interview during the OSU residency of *Elevator #7,* Fine discussed the use of head-mounted displays saying, "in terms of the best immersive experiences we can have right now, the cheapest, fastest, most reliable immersive experiences we can have are through head mounted displays". However, Fine had reservations about the head-mounted displays.

> I think it's clunky. I think that there's all kinds of psychological ramifications that we don't know about. I'm of a generation where your mother would say 'don't sit so close to the TV' and now we're strapping

> high-resolution bright screens [to our faces]. What is that doing to our neural pathways? It's visual stimuli that's giving us a physiological reaction.

The physiological reactions that virtual reality can elicit are powerful, and Fine was concerned that the long-term impact of a device that takes over the user's visual cortex is not well known. Fine viewed the intersection between theatre and virtual reality as an in-between step rather than a final destination. When asked about the potential he saw in the intersection between theatre and virtual reality, he said, "We are on the path. What we're all trying to do is get as quickly as we can to the holodeck." This holodeck, originally from *Star Trek,* is the subject of Janet Murray's *Hamlet on the Holodeck,* which describes the holodeck as "a universal fantasy machine, open to individual programming: a vision of the computer as a kind of storytelling genie in the lamp". (15) This statement could apply to virtual reality, which is responsive to the individual input of the user and is used to tell stories in multiple genres.

However, Fine views the single-person headset as a severely limiting factor. "I don't like head mounted displays. I think that they are the opposite of everything we're trying to do with theater, which is a communal event. And for me, this is just where we are in technology". *Elevator #7* pursued the communal feeling of a conventional theatre performance by including a seated audience, but this audience functioned as an impartial observer to the technical feats and elaborate backstage choreography that made *Elevator #7* run smoothly. The emotional core of the narrative was shared between the performers and the guest wearing the virtual reality headset. With projects like *To Be with Hamlet* that

allow multiple users to share the same environment, the VR headset still provides a focused, singular experience. This singular experience is distinct from the communal experience of sitting in an audience, but it still fosters a sense of intimacy. Even if virtual reality eventually becomes a steppingstone to more sophisticated augmented reality, its current iteration has allowed theatre artists to experiment with creating the immersive sensation of live theatre in a new medium.

The hybrid virtual reality theatre contains alternate understandings of live performance and a convincing sensation of presence. The discussion of what constitutes conventional liveness has been further complicated by the COVID-19 pandemic. Major regional theatre companies such as the National Theatre have turned to live-streaming plays over the internet for audience members in quarantine or under shelter-in-place orders to view.[53] The long-term impact of this sudden interest in digital delivery of live performance is impossible to predict at this point, but it may shift the broader cultural understanding of live theatre to include performances that assemble an audience from remote viewing locations. Theatre is adapting in real-time to a world in which live theatre that includes an audience physically assembling together is prohibited. The ontological debate over what makes live theatre "live" is playing out in real time, and the results have the potential to have a lasting impact.

Jerald Raymond Pierce, writing for American Theatre Magazine reported on how online streaming platforms are reacting and adapting to the sudden pivot to digital access being pursued

[53] In the spring of 2020, theaters and performing arts venues were financially shuttered, with performances being delayed or cancelled as a result of the global coronavirus pandemic. In an effort to slow the spread of the virus, and reduce the amount of cases of COVID-19, the respiratory illness caused by the novel coronavirus, local and national governments have ordered the closure of non-essential businesses and entertainment venues, and severely limited the amount of people allowed to congregate to combat community spread. With these sudden and drastic changes, theatre artists are turning to methods of tele-performance and telepresence.

by many theatres across the country. In *Streams Before the Flood? Streaming and Video-Captured Options for Shuttered Shows Could Be More Than a Stopgap Solution,* Pierce examined the technological, legal, and aesthetic considerations driving the decisions made as theatres adapt live performance for remote viewing. On the legal front, Actor's Equity reached an agreement on March 18th, 2020 offering temporary streaming rights available to eligible producers in areas with legal limitations on public gatherings.[54] This arrangement comes with restrictions, however. Equity productions cannot simply upload a recorded performance to a streaming platform such as BroadwayHD for wide public consumption. Instead, producers under this temporary agreement can record performances, sell tickets to these performances online, and then offer the performance to ticket holders as a one-time stream. Pierce explains, "In essence, the idea is to make the patron experience as close to a true theatrical experience as possible" (americantheatre.org).

In this case, the "true theatrical experience" is created through limitation. Tickets for a filmed production of Chicago-based Theater Wit's *Teenage Dick* were limited to 98 per viewing to match the number of physical seats available at Theater Wit's stage. The playback features on the online video are limited, not allowing rewinding or fast-forwarding. Pausing the video is possible but, according to artistic director Jeremy Wechsler, not encouraged. Wechsler explained, "I really think it's important for a theatre to preserve as much of that experience as possible. What we're trying to do is say, 'Come to the theatre with us'" (americantheatre.org). Part of this adapted theatrical experience included a pre-show video leading the viewer, through the point of view of a camera, through the lobby into the theater, and ticket holders were encouraged to start their video at the same time as the scheduled performance would have taken place. In this configuration, a

[54] https://actorsequity.org/news/PR/March18/

"true" theatrical experience was pursued through crafting an experience for the viewer that distinguishes watching the pre-recorded performance from watching a streamed film. The performance is not live, so the impetus for re-creating a conventional theatrical experience is placed on the viewer, not the content. In this solution to socially-distant entertainment, "true" theatre was defined by restricting the audience's accessibility to the performance.

A National Geographic feature on how the New York City arts scene is adapting to the COVID-19 outbreak described theatre projects commissioned for online performance.[55] Pulitzer Prize-winning playwright Martyna Majok described these performances as a hybrid medium:

> A lot of this new work — that I've seen, at least — ends up being this hybrid live film/theatre experience. You do feel the 'liveness' and 'in-the-momentness' of some of them — like when there's technical difficulties, which I often love because I love watching artists create and problem solve in the moment, whether it's on stage and there's a prop they accidentally dropped or forgot to bring on, or whether it's on Zoom and their cat walks into the frame, or they can't turn on their mic. I've found that those kinds of 'live' moments can bond an audience to the story and the performer. You feel it 'happening' and being made for you. So there's a little taste of live theatre in them. But you don't feel it being made *with* you, necessarily. There isn't necessarily that energy exchange, that exciting, alive reaching out by performer and response by audience that's born out of sharing space. (nationalgeographic.com)

[55] https://www.nationalgeographic.com/history/2020/06/new-york-arts-scene-shuts-down-indefinitely-can-evolve-survive/?fbclid=IwAR0DAI3eUjo5CDUlTuRizxLjvznKCKWq5kRzUro7KL02BV-2XMgM6aYMuuM

In this hybrid medium that emerged due to limitations placed on people gathering, Majok misses the relationship between the audience and performer present in conventional live performance. In this hybrid relationship of theatre and film, a sense of "liveness" is achieved when something goes wrong and performers improvise and adapt.

With many theatre companies opting to offer their content online, critics and audience members are questioning if live theatre is possible without a communal audience. *New York Times* theatre critic A.J. Goldmann asked this question by investigating recorded performances from several German theatre companies in a feature titled *Online, the Show Goes On. But It's Just Not the Same.*[56] Goldmann claimed that

> Theater is a living, breathing art form whose unique power comes from the proximity of performer to spectator. Sophocles, Shakespeare and Chekhov may speak to us through the ages, but it is the immediacy of live, never-to-be-repeated performance that gets us hooked and keeps us coming back for more. How much of that spontaneous, live-wire excitement can ever come across in a recording? (nytimes.com)

For Goldmann, theatre's appeal and its defining characteristic is liveness. That liveness is defined by two qualities, the "never-to-be-repeated" nature of performance, which follows Peggy Phelan's ontology, and the physical proximity of "performer to spectator". These qualities prohibit livestreamed or pre-recorded performances from being considered true theatre. Goldmann granted

[56] https://www.nytimes.com/2020/03/26/theater/theater-streaming-online-schaubuehne-muenchner-kammerspiele.html?smid=nytcore-ios-share&fbclid=IwAR0XV9iII8dyL9K5XMQNsnpA6Z45mkNIx36xyHyoGuFKx1MTXvDqs9WNk6U

that certain performances are more effective than others when viewed at home. He pointes to the Berlin Schaubühne's inaugural production of Bertolt Brecht's *The Mother*, filmed in 1970 as an example of a theatre performance that successfully navigated the transition from stage to screen. The archived recording's patina of grainy footage and low-quality audio created enough distance for Goldmann to forgive the production's lack of conventional liveness. He explained that "watching the muddy, 50-year-old, black-and-white video seemed closer to unearthing a time capsule than discovering a living work of theater" (nytimes.com). In his article Goldmann concludes that "Technology certainly has the power to make us feel less alone during a time of social distancing and quarantine, but there are limits to just how much of the theatrical experience it can transmit... streaming theater falters when it comes to the heart-in-mouth immediacy of a live performance. There's just no substitute for the real thing" (nytimes.com).

Streaming theatre performances to a home audience sacrifices the communal experience that makes theatre "real" for Goldmann and other critics with similar concerns. However, that conventional understanding of liveness limits the reach of theatre, rendering it inert and lifeless in a time of pandemic. The hybridity of virtual reality performance combines alternative aspects of liveness to bring immediate, present performance to viewer-participants. Goldmann's article demonstrates the potential for conventional theatre to become mired in ontological arguments that limit the art form's ability to adapt to a global disaster. The hybrid virtual reality theatre exists in multiple formats, including performances that are available to a home audience. With the future of in-person gatherings uncertain for the foreseeable future, a hybrid medium that prioritizes the relationship between viewer and performer offers an alternative to the in-person connection that streamed theatre performances lack.

A feature posted by DC Metro Theater Arts[57] on April 8th, 2020 presented two sides of a fierce debate over the future of post-pandemic theatre. In *What's the future of live theater beyond COVID-19?*[58] playwright Audrey Cefaly and actor Elliot Bales engaged in a point-counterpoint debate, with Cefaly railing against resistance to the move online and the limited reach of current theatrical performance. Cefaly advocated for a collaboration of film and theatre to respond to the current unavailability of communal live performance, and also as a way to make theatre more accessible moving forward. She claimed that

> Theatre is in trouble not because of a worldwide pandemic. It is in trouble because of its *unwillingness* to evolve. Adapt or Die… At the root of it is an entrenched binary: *live theater or no theater*... I envision a world where professional filmmakers are embedded directly into the theater space and work closely under the same roof with its artists to create a cinematic rendering of the play for livestream. I do believe that getting in bed with film is the only way we are going to ultimately survive. (dcmetrotheaterarts.com)

[57] DC Metro Theater Arts provides online coverage of performing arts in Washington, DC and the surrounding area. The website offers critical reviews, interviews, and news. It was founded in 2012 by publisher and editor Joel Markowitz. https://dcmetrotheaterarts.com/about-us/

[58] https://dcmetrotheaterarts.com/2020/04/08/what-is-the-future-of-live-theater-after-covid-19-a-point-counterpoint-between-audrey-cefaly-and-elliott-bales/?fbclid=IwAR1pQ5oAK62B1m1J9BkHKbMMdrrrONdA5KnQlODrpbUVtXwVEvtvuaC66Wg

Bales countered this assertion with an economic argument, claiming “There will be no new consumers of theater from streaming... I don’t see anyone clamoring for theatrical performances who don’t already go to the theater”.

This debate is specific to theatrical performances being streamed online but asks broader questions about the future of theatre. The hybrid virtual reality theatre offers an answer to many of these questions that involve turning theatre into cinema or defining liveness through restricting the audience’s access and behavior. In a time of enforced solitude, the immersive world of virtual reality performance offers a literal escape from confinement. The world of virtual reality performance is marked by an illusion of place so complete that the viewer’s body instinctively reacts to the digital environment. The illusion of presence created in virtual reality offers a sense of human connection that audiences in isolation desperately seek through art.

Outside the moment of pandemic, the hybrid virtual reality theatre offers a glimpse into a theatrical future that includes alternate definitions of liveness. This expanded understanding of liveness recognizes the importance of the audience-performer relationship and the sense of community fostered in theatrical performance but refuses to let theatre be defined solely by the “live or not live” debate. The hybrid virtual reality theatre demonstrates how theatrical aesthetics and performance practices function in a new medium and animate the medium of virtual reality in ways that are distinct from both video games and cinema. A hybrid virtual reality theatre declares that the oft-idealized “magic” of theatre exists beyond the conventional understanding of live performance and has a dynamic future.

Chapter Six: Conclusion

"Liveness" is frequently used to distinguish theatre from other forms of entertainment, however, the concept of "liveness" has shifted over time. Scholars such as Claudia Georgi have illustrated how technological innovation altered the definition of liveness by establishing a clear binary of "live" versus "recorded" performance. Further technical innovation blurred this clear distinction by allowing performances to be technologically mediated and still be received as "live" performance by an audience.

If there is no simple definition of "liveness", defining theatre solely through its liveness is unsatisfactory and incomplete. Examining the intersection of virtual reality and theatre as a hybrid medium facilitates an analysis of "liveness" that includes elements from conventional theatre as well as virtual reality. This understanding of "liveness" in a hybrid medium allows the discussion to move past the anxiety over whether or not a technologically-mediated performance is "live".

The characteristics of "live" performance in the hybrid virtual reality theatre that are examined in this study are interactivity and presence. Interactivity is present in the virtual environment experienced by the user or viewer of a virtual reality performance. The ways in which the environment responds to the user's input define the project's interactivity. Highly interactive environments are also a distinguishing characteristic of virtual reality video games. However, in the hybrid virtual reality theatre, narrative is prioritized over user control. In the interactive environment of a video game, there are typically goals or win conditions, and the user's goal-

oriented behavior is rewarded. In a virtual reality performance, the viewer does not have the expectation of "winning", but rather expects to experience a narrative.

Along with interactivity, presence is a distinctive element of hybrid virtual reality theatre. The interactive environment of virtual reality has the potential to create various illusions of presence. One of these illusions of presence grounds the viewer/participant in the digital environment through a digital representation of their physical embodiment. This sense of embodied presence establishes the viewer/participant as an active participant in the digital environment. It is also possible to facilitate a sense of co-presence between the viewer-participant and the performer. In three of the four performances examined in this thesis, performers directly address the viewer-participant and invite them to interact with the environment and/or narrative. This co-presence provides a simulacrum of the presence that occurs in conventional live performance, where the audience and actors share a space. However, in hybrid virtual reality theatre, co-presence is focused on an individual spectator rather than a group of spectators, providing a more intimate experience. The head-mounted display makes the viewing experience more individual than communal, even in cases where multiple viewer-participants can experience a performance simultaneously.

Hamlet 360: Thy Father's Spirit, To Be with Hamlet, Chained: A Victorian Nightmare, and *Elevator #7* share common characteristics that help define the hybrid virtual reality theatre. Each project provides an interactive immersive environment that may be navigated in various ways by a viewer-participant. Each project creates an illusion of presence. This is achieved by grounding the viewer-participant in the digital environment through haptic feedback or a visual representation of their embodied presence or by fostering a sense of co-presence between the viewer-participant

and the performers. In the hybrid virtual reality theatre, the viewer-participant becomes an active spectator. These characteristics establish basic parameters of this hybrid medium.

The COVID-19 pandemic forced an urgent consideration of the question "what makes theatre, theatre?". Along with reaching into their archives to release pre-recorded productions, many theatre companies have scrambled to find innovative ways to perform via videoconferencing platforms such as Zoom. Many of these performances are streamed in real time or allow audience members to join the same video call as the performers. Without the ability to gather in person, a makeshift virtual theatre arose. The same ontological questions that apply to hybrid virtual reality theatre can also be asked of this form of theatre-making. Is it still live theatre without people gathering in the same space? What makes it different from a filmed medium like cinema or television? These unconventional performances are not merely ways for theatre makers to keep occupied while under lockdown orders or in quarantine. They are a response to an existential threat. This temporary virtual theatre, like the hybrid virtual reality theatre, demonstrates that theatrical aesthetics are potent enough for an audience to identify a performance as theatre even if it does not meet conventional criteria. Virtual reality has been criticized for not offering enough beyond a "wow" factor. However, conventional theatre faces a similar limitation. Critics such as A. J. Goldmann claimed when reviewing virtual theatre performances that nothing can replace the "magic" of theatre that comes from actors and audiences sharing the same space. If this single factor is the defining characteristic of theatre, this places undue restrictions on the artform. The global pandemic has shown that theatre artists are eager to work outside that definition and still call their work theatre. The hybrid virtual reality theatre, even if it becomes a predecessor to the

utopic holodeck, offers a way for theatre to surpass conventional definitional restrictions by recontextualizing “liveness” in a digital medium.

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