

THE SOUND OF IMMERSION:

Exploring the Impact of Real-Time Diegetic Sound Effects on Actor Immersion in Virtual Production

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*This research paper is submitted in partial fulfilment of the requirements
for the degree of Bachelor of Arts in Creative Business*

In the programme

*Creative Business
Academy for AI, Games, and Media
Breda University of Applied Sciences*

04.06.2024

Acknowledgments

With this section, I would like to acknowledge and thank the countless people who stood behind me at every step of my graduation project. Without their incredible support, this thesis would not otherwise have come to fruition. Specifically, I would like to call out the help of the following persons: my company supervisors, Dr Carlos Pereira Santos and Joey Relouw, Ma, who offered their continued guidance and critical feedback, and who were always there to steer me in the right direction. Furthermore, to my Capstone supervisor, Çağrı Sümengen, Ma, I express many thanks for her countless devoted hours and preparation. Believing in me and my abilities, these three faces allowed me to strive for new heights—both in my academic and personal life.

Following, I would like to show appreciation to all my colleagues at Cradle for their uplifting words, especially to Jens Hagen, whose expertise guided the technical set-up to my test shoots. I would like to thank Breda University of Applied Sciences, and all the lecturers from the Academy of AI, Games, and Media, who gave me the foundation necessary to complete this assignment. I want to recognise the efforts of Dr. Mata Haggis-Burridge; for their help in facilitating my collaboration with the Virtual Production Studio Network project and for pioneering said workshop. At the same time, I would like to say thank you to all the lecturers and students who participated in the project—this gave me the platform to conduct my test shoots. Naturally, I would like to thank the anonymous participants, whose contributions and insights were critical for this research paper.

To all my friends, past and present, I thank for all the fun moments shared throughout the last five years. Finally, I would like to express my gratitude to my family for their unconditional love, both mental and financial support, as well as complete understanding. They gave me the hope and strength to see this chapter of my life to a close.

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Glossary

The glossary below provides definitions for the different terms, abbreviations, and acronyms utilised in the research report. All terms presented were derived from the Virtual Production Glossary (2023), unless otherwise specified. “Epic Games, along with the ASC, Netflix, and the VES, supported the creation of the Virtual Production Glossary as a standard reference for professionals arriving at the world of virtual production” (Zwerman & Okun, 2024, p. 4).

CGI	Computer-Generated Imagery: An image or images created or manipulated with the aid of a computer.
Chroma-key	A keying technique that allows one to separate an object from its background based on colors that are unique to either the foreground or background.
DAW	Digital Audio Workstation: An audio production software or platform designed for the recording, editing, mixing, and mastering of digital audio files (Avid, 2023).
Game Engine	Software-development environment designed for people to build video games.
Green Spill	Any contamination of the foreground subject by light reflected from the green screen in front of which it is placed.
Immersion	The sensation of feeling present in a digital environment.
LED wall	A modular array of LED panels which display video content.
Parallax	The perceptual difference in an object's position when seen from different vantage points.
Previs	Previsualisation: A collaborative process that generates preliminary versions of shots or sequences, predominantly using 3D animation tools and a virtual environment.
SFX	Sound Effects: In a radio or television programme or a film, one of the sounds other than speech or music that are added to make it seem more exciting or real (Cambridge Dictionary, 2024).

UE	Unreal Engine: The most powerful real-time game engine (Epic Games, 2024a).
VE	Virtual Environment: A virtual space accessible through a computer
VFX	Visual Effects: A broad term that refers to just about anything that cannot be captured using standard photographic techniques.
Virtual Production	A technology used to join the digital world with the physical world in real-time.
Volumetric Stage	A stage purpose-built for virtual production which might include LED walls, tracking systems, real-time animation, performance capture, and VR capabilities.
XR	Extended Reality: The collective name for VR and AR.

1. Research Introduction

1.1. Context

1.1.1. Defining Virtual Production

Virtual Production is seen as an umbrella term for “a spectrum of computer-aided production and visualization filmmaking methods” (Kadner, 2019, p. 3) Zwerman and Okun (2024) added to this definition by stating that Virtual Production is “any filmmaking process or workflow that removes the barrier between virtual and physical” (p. 1). Industry experts believe that this tool is causing a positive shift in the industry; the interactions between production departments are now more flexible and effortless (Kadner, 2019; Zwerman & Okun, 2024).

Figure 1

Virtual Productions (Cradle, 2023)

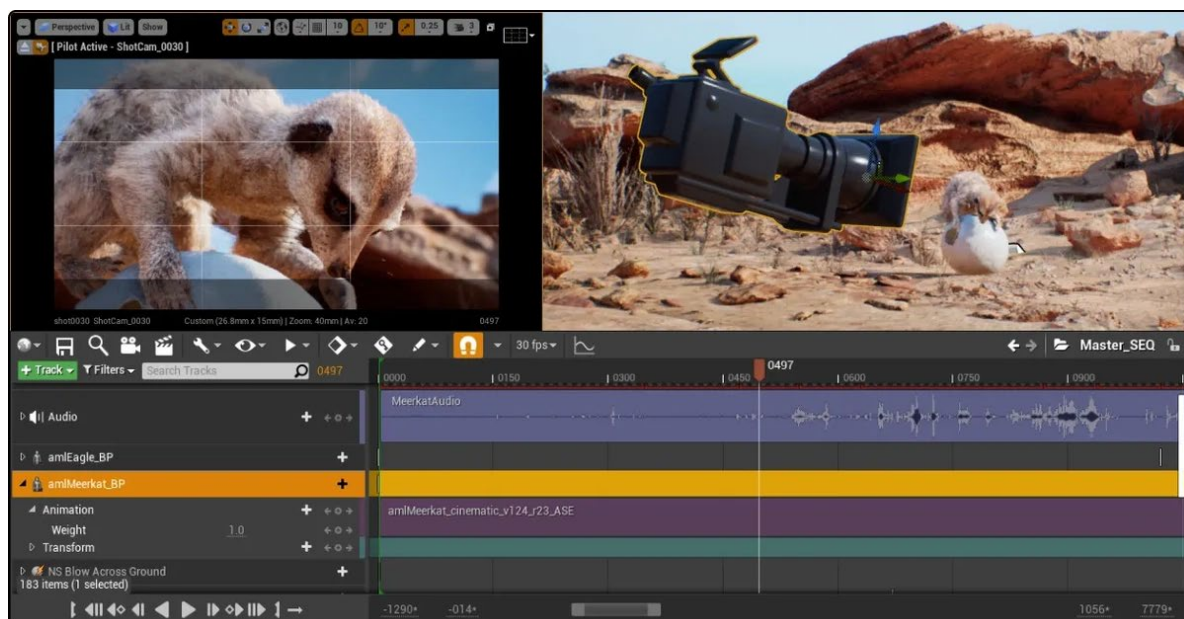


Virtual production is not an entirely new filmmaking technique. It has existed for as long as computers have assisted traditional film productions, most notably in the form of CGI, motion capture, and live compositing (Kadner, 2022a). What *is* new is the use of game engine technology with real-time camera tracking, combined with an LED wall (Kadner, 2022a). There are various types of Virtual Production, however, this paper will focus only on

one. Nevertheless, these types range from live green-screen replacement to full digital replacement of actors, environments, and cameras (Zwerman & Okun, 2024). Here is where the first point of distinction arises. Zwerman and Okun (2024) refer to one technique as “live green screen replacement” in which an LED wall is utilised in place of a traditional green screen. Virtual Production technicians project “final-frame 3D imagery to the wall in real-time, allowing the cast and crew to become immersed in the space, both story-wise as well as physically” (Zwerman & Okun, 2024, p. 5). Furthermore, “[t]he render is presented from the perspective of the in-world shot camera, which means that as the shot camera moves, the digital environment rendered to the LED wall updates its perspective” (Zwerman & Okun, 2024, p. 5). Whereas Kadner (2019) would dub the same process as “Live LED Wall In-Camera Virtual Production” (p. 17). This method also allows for an “image output from real-time engines to a live LED wall in combination with camera tracking to produce final-pixel imagery, completely in camera” (p. 17). Additionally, “[c]ompared to green screen cinematography [...] everyone can see exactly what is in the shot as it unfolds in real time” (Kadner, 2019, p. 17). Similarly to the explanation by Zwerman and Okun (2024), Kadner (2019) also highlights this aspect of the synchronised parallax from the real camera and digital camera. The author of this study acknowledges the similarities between the two definitions provided and will use these terms interchangeably throughout the report, as they refer to the same concept. This practice is demonstrated in Figure 1. The specified use of these Virtual Production tools is most relevant to the context of this paper, considering that is the configuration the author had access to throughout the conception of the project. These limitations and more are discussed in Section 1.5.

Figure 2

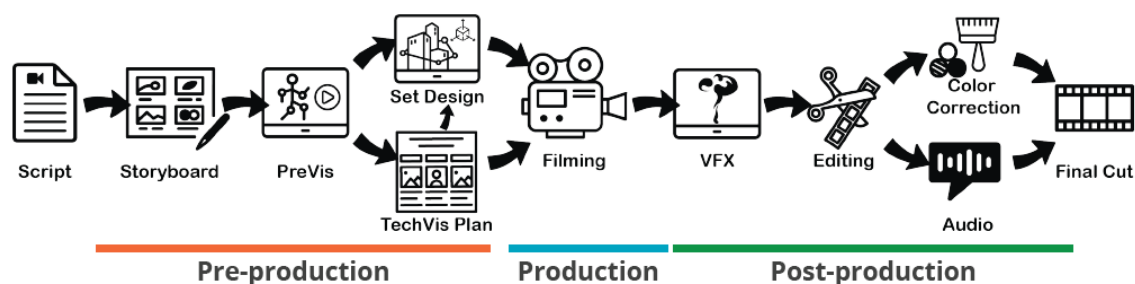
Unreal Engine (Epic Games, 2024a)



As mentioned previously, Virtual Production can be accomplished in different ways, though there is usually some form of real-time application involved. This would not be possible without the use of a game engine, such as Unreal Engine (Epic Games, 2024a), which is primarily used to create virtual environments, VEs (as shown in Figure 2). Zwerman and Okun (2023) claimed that Unreal Engine is seen as “the de-facto standard for real-time render engines in virtual productions” (Zwerman & Okun, 2024, p. 16). Noah Kadner defines one of the biggest advantages to using Unreal Engine, UE, stating that “[g]ame-engine technology is capable of simulating real-world physics, meaning assets created in the engine can have a one-to-one relationship to the real world” (Kadner, 2021, p. 11). Additionally, through additional software and trackers, the real-time engine is able to produce a synchronised view of the virtual environment as the equivalent real-world camera, “even to the point of precisely matching shadows if you define the virtual time of day” (Kadner, 2021, p. 11). This effect is called *parallax*, which is one of the defining features of in-camera visual effects using LED wall technology (Kadner, 2019; Kadner, 2021; Zwerman & Okun, 2024).

Figure 3

Production Pipeline Overview (Santos et al., 2023)



As a result of having the visual effect in-camera, the brunt of the work, especially in the preparation of assets, is put before production has begun or in the pre-production phase (Santos et al., 2023; Zwerman & Okun, 2024). That is where the phrase *Plan It in Pre*, or *Fix It in Pre*, arises as an antithesis to one from traditional filmmaking—*Fix It in Post* (Kadner, 2019; Zwerman & Okun, 2024). This shift results in a pipeline that resembles the one demonstrated in Figure 3. This allows for a more prepared approach to filming as “[c]ritical creative decisions can be made much earlier, avoiding the need to recreate work or rebuild assets multiple times across the life cycle of a project” (Zwerman & Okun, 2024, p. 2). One way that film studios accomplish this is by creating a *previs*, or previsualisation, a descendant of the storyboard (Kadner, 2019). This process involves generating a rough animation of the full-length film (Santos et al., 2023), and “can include music, sound effects, and dialogue designed to approximate the look and feel of final sequences” (Kadner, 2019, p.

12). As well as for aesthetic reasons, the previs is used to “plan and communicate the visual elements of a scene, such as camera angles, character movements and special effects” (Santos et al., 2023, p. 30). By first constructing the scenes digitally, filmmakers can make the desired changes “without incurring the cost of actual production” (Kadner, 2019, p. 12).

Before the adoption of real-time in-camera visual effects using an LED wall, the film industry would use green screen techniques to achieve the same results. In traditional filmmaking, a green or blue backdrop can be used as “a placeholder for background imagery to be added in post-production” (Kadner, 2022b, 00:08). It is a solid-coloured background that can be isolated and replaced using chroma key software (Santos et al., 2023). However, this method poses its own set of challenges. As the background of the shot being filmed cannot be seen in real-time, the various crew members involved in the production have to account for the absence of this visual component. They would need to estimate how to frame or light the shot properly, so that it will seamlessly match the final composite. Additionally, the reflective green screen casts its own green-coloured light, which reflects onto the subject, compromising the shot; this phenomenon is known as *green spill* (Kadner, 2022b). It is a costly and time-consuming issue to fix, and in worse cases, resulting in reshoots (Kadner, 2022b; Santos et al., 2023). In its place, Virtual Production offers an immersive, adjustable, and more sustainable approach to filming (Santos et al., 2023).

One major advantage to Virtual Production using an LED wall is the aspect of *immersion*. As the game engine transmits high-quality final-frame imagery on the LED wall, all crew members have a “shared sense of diegetic space” (Zwerman & Okun, 2024, p. 6). The specific benefits that the shared frame of reference provides for actors are discussed in Section 2.2.2. Additionally, The LED wall provides a realistic light emission, “[t]his ensures the talent, props, and set are responsive to environment lighting” (Zwerman & Okun, 2024, p. 6), which added to the sense of realism (Kadner, 2021).

1.1.2. The Research Gap

Despite the clear advantages that Virtual Production offers to filmmaking, the employment of real-time in-camera visual effects using an LED wall presents some issues. As a novel technology, there is a steep learning curve that comes with adopting such a workflow (Zwerman & Okun, 2024). Consequently, there is a global research gap in Virtual Production, and specifically audio, compared to other aspects, such as cinematography and visual effects, VFX. This is what Zwerman and Okun (2024) refer to as *image-centric bias*; “[p]roduction sound is not afforded the same level of support or consideration as are camera and lighting departments. The quality of dialogue recordings is often compromised as a result of the current on-set hierarchical structure” (p. 207). Additionally, due to the curve of the LED wall, sound reflections arise and are exacerbated by the volumetric space holding the

equipment, creating an *acoustical echo chamber*. This, however, presents a unique opportunity for exploration. The research paper hinges on the idea that the same benefits that the LED wall provides for actor immersion can be augmented by the use of diegetic sound effects, SFX. Though this topic is left largely unexplored, the study drew on two main papers, which suggest a correlation between sound and immersion during the filming stages of Virtual Production (Bennett, 2020; Nelson-Tabor, 2021). Inspired by the problem that sound reflections impose on audio recording during filming, as well as the lack of research delving into audio, this study investigated the effects of using real-time diegetic SFX during production on actor level of immersion in the Virtual Production.

1.2. Research Questions and Objectives

In light of the abovementioned research gap, this research report responded to the following research question:

How does the application of real-time diegetic sound effects impact the level of immersion actors experience during a performance in Virtual Production?

The primary aim of this research was to investigate whether a link between the use of sound during filming and immersion in the virtual environment exists. Several objectives were adopted to reach a definitive conclusion. In order to determine how to effectively structure the test shoots which facilitated the data collection, the paper aimed to examine the current state of the research on this topic. It sought to draw on both academic and industry sources in order to accomplish this in the Literature Review. Established on Virtual Production practices, the paper attempted to deliver a technical diagram, showcasing the processes needed to produce real-time audio playback. By conducting semi-structured interviews, the author attempted to collect a robust and nuanced recount of the individual experiences of the actors who participated in the study. The paper strived to analyse the collected data and synthesise it into a table of overarching themes regarding the experience of the experiment.

1.3. Research Approach

This research paper assumed a qualitative approach, which was informed by a phenomenological paradigm. Phenomenology aims to characterise a phenomenon as it appears to an individual in their lived experience (Gill, 2020). The phenomenon being investigated in this report is centered on the level of immersion of the participant in the virtual environment as facilitated by added real-time diegetic SFX. To accomplish this, the data collection process was facilitated by the use of quasi-experimental test shoots. During said

Virtual Productions, key diegetic SFX were played to provoke a reaction within the actors. In order to acquire substantial insights from the phenomenon, it was expected that the author draw on the personal accounts of the participants to define the self-reported level of immersion. For this reason, the study employed Interpretive Phenomenological Analysis (Smith & Osborn, 2003), which granted the author the opportunity to explore the experiences of the actors in great detail and depth. Through an extensive thematic analysis of the transcribed interviews, the report presented a table of emergent themes, showcasing the nuances of this experiment.

1.4. Relevance and Importance

While there has been research on ways to facilitate actor performances in Virtual Production through mediated levels of immersion in the Virtual Environment (Bennett, 2020), little has been focused specifically on the effects of audio on the level of immersion actors experience during a performance in Virtual Production. In point of fact, Bennett (2020) suggested that the topic of auditory stimuli be explored further. Moreover, in their reflections, Nelson-Tabor (2021) noted that one actor who played in the short-film experienced heightened immersion on account of the keynote sounds played on-set. Due to the use of an LED wall and game engine graphics, aspects such as vividness and proprioceptive matching (Slater & Wilbur, 1997) already appear to be present in Virtual Productions and contributing to actor immersion levels. In the same manner, there have been successful studies done on the way that audio can enhance levels of immersion in the VE (Lombard & Ditton, 1997; Slater & Wilbur, 1997). This paper goes beyond similar research, such as Bennett (2020) and Nelson-Tabor (2021), while testing known perceptual immersion techniques of introducing sounds to the mediated experience (Lombard & Ditton, 1997; Slater & Wilbur, 1997) and presents a comprehensive look at what impact real-time diegetic SFX pose on the level of immersion actors experience during a performance in Virtual Production. The proposed procedures for real-time diegetic SFX implementation in Virtual Production, seen in Figure 10, can seamlessly blend with the existing audio recording and sound design techniques.

Despite being an often-overlooked aspect, academics and industry professionals recognise the immense importance of sound, both in everyday life and in film (Lombard & Ditton, 1997; Stevens & Raybould, 2016; Zwerman & Okun, 2024). Motivations for writing this research paper are additionally founded on the lack of existing literature on audio engineering in Virtual Production (Zwerman & Okun, 2024), and specifically its effects on immersion. Considering real-time in-camera visual effects using an LED wall is a relatively new practice in the filmmaking industry, it depends on interdisciplinary collaboration and open-access of information. Most of the existing literature on Virtual Production is written by

names with decades-long experience in the film and games industry (Kadner, 2019; Kadner, 2021; Zwerman & Okun, 2024), the same people who are making the *tools* for successful Virtual Production shoots. Thus, the Virtual Production community holds resembles with the eSports industry. Scholz (2019) outlined three formative concepts: coopetition, co-destiny, and convergence. Collective understanding of the intersectionality of industry is a prerequisite to coopetition. It highlights “the potential to improve the whole network by cooperating in certain areas and fiercely competing in others”, aspects such as creative outcomes of Virtual Productions (2019, pp. 117-134). Scholz (2019) stated that “[a]s competitors collaborate, they can discover a shared understanding of their business, potentially developing a shared vision and devising a deliberate strategy for their industry” leading to the formation of co-destiny within the community (2019, pp. 117-134). In Virtual Production, this aspect is clearly demonstrated by the formation of associations such as the Visual Effects Society (2024).

This introduces a position for the commissioning company of this research report, Cradle (2023), to fill. As an internal Research and Development department of an educational institution, Cradle has the unique opportunity to allow students and young professionals a space—the LED wall volumetric stage—to expand on their expertise in the field, alongside developing applied research skills. Therefore, this paper serves not only as a benefit to the Virtual Production community but also to educational institutions looking to expand their proficiency with LED wall technology.

This research is also addressing the growing adoption of Virtual Production in the film industry and how it is expected to become the standard approach to production in the future (Kadner, 2019; Zwerman & Okun, 2024). As such, it is essential to gain in-depth knowledge of the sound engineering process and what benefits it poses to actor immersion levels during performances in Virtual Production. Furthermore, the study of presence is key in guiding and designing future technologies (Slater & Wilbur, 1997), which has important implication for Virtual Production.

1.5. Research Limitations

The author of this paper encountered several challenges during the conception of the research. Despite extensive efforts to address the limitations, they had a significant impact on key areas of this study and dictated the research design. One of the main challenges was the lack of time and budget. Within the context of the study, time refers to the months allotted for the completion of the bachelor thesis dictated by the final submission date. Whereas budget refers to the monetary compensation provided by the commissioning company, used for the purpose of filming Virtual Productions. Due to these constraints, two test shoots were

employed to replicate the quasi-experiments. This affected the number of actors who participated in the productions, as well as their level of experience. Additionally, as the assumed data collection and data analysis procedures are highly time-consuming, the author interviewed only three participants. Furthermore, the testing phase had to be completed in two parts, meaning that not all participants acted in the same Virtual Production shoot, and therefore received drastically different experiences. The different productions utilised entirely separate VEs and diegetic SFX. This greatly affected the quality of the data presented and should be taken into consideration. Parallel to this, the technical equipment employed for the test shoots was provided by the commissioning company. The quality of the speakers and their positions relative to the actors could not be replaced or moved. The MIDI controller specifically posed some latency issues, which resulted in an unsynchronised playback of the sounds and visuals. Though initially focused on the quality of the final creative outcome of the quasi-experimental productions, the scope of the research also had to be limited to fit the time constraints. This suggestion, however, was still explored in Section 6.3. Naturally, a distinct limitation of this study was the lack of topic-specific literature, though the author was able to piece together relevant information to form a foundation for the rest of the paper.

It is important to note the constraints which resulted from the assumed research design. Though the phenomenological paradigm of this study permitted the author to explore the complexities of the testimonials of participants, it is often criticised for producing data which is non-generalisable to a larger population (Ayton et al., 2023). Smith and Osborn (2003) argued that, as Interpretive Phenomenological Analysis, the chosen analysis method, is devoted to said detailed recounts of the actors, it can only realistically be done on a small sample size. Additionally, the semi-structured interviews held during the data collection process were conducted with actors whose first language was not English. As such, the participants had to rely on their limited vocabulary in order to convey their experiences, as well as the author to accurately represent their experiences. In the same manner, the Interpretive Phenomenological Analysis enabled the author to derive meaning from the statements of participants, which was not already apparent (Smith & Osborn, 2003). The issues of trustworthiness are addressed in Section 3.7.

1.6. Research Structure

Subsequently, the second chapter of this research report presents a review of the relevant literature. Though not exhaustive, the Literature Review focuses on four distinct aspect in order to answer the research question: *Virtual Production*, *presence*, and *properties of sound*. Each section attempts to present the most relevant sources on the topic and showcase the underlying theory behind every approach taken in the study. Chapter three

detailed the methodological approach. This research paper follows the structure of *the Research Onion* as proposed by Saunders et al. (2007), which argues that before the author can concern themselves with data collection and data analysis techniques, they must first *peel away* all the layers of the onion—starting with the research philosophy. The separate layers are shown in Figure 5. By employing this structure, the author was able to cover each aspect of the research design of the paper in detail. Furthermore, in the research design section of the methodology, each aspect is divided into *theory* and *application* to improve legibility and facilitate the exchange of information regarding the set-up of this study. Most critical to mention is the use of a phenomenological paradigm. Additionally, as prefaced by the use of Interpretive Phenomenological Analysis (Smith & Osborn, 2003), this research report negates the formation of a *results* chapter and replaces it with the presentation of the quasi-experimental test shoots used to facilitate data collection. Said chapter proposes a comprehensive diagram of the necessary technical set-up seen in Figure 10. Following, discussions of participant insights are presented and compared in relation to the literature. The extensive analysis of interview transcripts produced an overview of the overarching themes related to the experiences of actors performing in Virtual Production. The final chapter explores recommendations for future research and additionally identifies recommendations for industry aiming to adopt practices to enhance actor immersion in Virtual Production through auditory stimuli. A summary of the conducted research concludes this report.

2. Literature Review

2.1. Introduction

This chapter provides a comprehensive look at the existing knowledge on the research topic from both academic and industry sources. The chapter focuses on four critical aspects relevant for answering the research question and reaching the research objectives. These aspects are Virtual Production, presence, and the properties of sound. Each section attempts to present the most relevant research on the topic, while creating a link throughout the literature. The review begins with Virtual Production, which is a foundational tool for this report.

2.2. Virtual Production

2.2.1. Audio in Virtual Production

Deriving from years of experience in the industry, Noah Kadner wrote one of the first texts on Virtual Production in 2019. In 2021, Kadner released the second volume in the series, in hopes of providing a complete guide for newcomers to this groundbreaking filmmaking tool. The two books present a series of interviews with industry professionals across different departments about the way they implement Virtual Production in their pipeline, offering readers guidance and inspiration. Additionally, the Visual Effects Society, VES, consisting of nearly 5000 industry practitioners, is a “nonprofit professional, honorary society” (2024) committed to the contribution of resources and knowledge on the art and science of visual effects (Zwerman & Okun, 2024). With several editions of the original *Handbook of Visual Effects* to their names, VES editors Zwerman and Okun released the definitive bible for Virtual Production professionals in 2024. As some of the little published literature on Virtual Production, the aforementioned sources are seen as the flagship of knowledge in the film industry and are formative for this literature review. Sound, however, is an often-overlooked aspect of filmmaking (Nelson-Tabor, 2021; Zwerman & Okun, 2024), as further evidenced by the lack of its mention in the literature employed in this chapter. The use of audio is still an integral part of any film and its importance for immersion and quality perception is discussed in Section 2.4.

2.2.1.1. Pre-Production. Audio in Virtual Production can be divided into three sections, each corresponding to the separate production phases, as demonstrated in Figure 3. In the pre-production phase, sound emerges as early as the creation of the script, as a storytelling device. Within the script, the way character dialogue is heard is marked next to their respective names, whether that is through a voice-over, a transmission device, or depending on where the speaker is relative to the viewer (StudioBinder, 2017). Additionally,

the way the line is spoken is also indicated in the script, referring to the tone of voice. It is marked in the same way as the former—between a parenthetical (StudioBinder, 2017). Furthermore, significant SFX are usually written as an action line in all capitalised letters (DeGuzman, 2022). A script breakdown of the sound design is then made to indicate important elements of the movie script. This entails “documenting early-stage sound design ideas, and the location sound’s important notes, such as any issues that could be present in certain environments” (Black Goblin, 2022). By doing so, the crew can mitigate any potential issues before filming, which aligns with the prepared approach native to Virtual Production. According to Black Goblin (2022) the script breakdown for sound design can be separated into three categories: *technical notes*, *artistic notes*, and *others*. Technical notes indicate the way sound will be recorded based on the limitations of the filming location. Artistic notes aim to bridge the gap between the visuals and sounds of a movie as to “bring more depth and tone to a scene” (Black Goblin, 2022). The categorisation other can be used to further divide the script notes based on what type of sound is needed for a particular film. Following this step, a previs is typically made to generate a draft version of the full-length film (Santos et al., 2023). The previs “can include music, sound effects, and dialogue designed to approximate the look and feel of final sequences” (Kadner, 2019, p. 12). In order to accomplish this, a spot list or spot sheet must first be made to explore what SFX need to be sourced, created, and synced to the final image (Black Goblin, 2022). The sheet typically includes start and stop time codes derived from the previs, as well as a description of the desired SFX (Serre, 2017). Once collected, all sounds are then placed on the correct timeline and exported in a finished version of the previs, which will then inform the final cut (Kadner, 2019). Though this step is normally delayed until the post-production phase (Black Goblin, 2022), Virtual Production once again offers a unique opportunity to carry over the completed work and deliver a shared point of reference ahead of time (Nelson-Tabor, 2021).

2.2.1.2. Production. Employing real-time in-camera Virtual Production poses challenges to sound engineering. Therefore, in the production phase, there are several elements to consider regarding audio. The volumetric stage, where the LED wall is located, creates sound reflections due to its configuration, affecting sound recording:

A vertical LED wall curved into a semicircular shape and capped with a flat vertical ceiling behaves like a parabolic microphone. Undesirable sounds, generated outside the stage, are picked up through the stage opening(s), amplified, and subsequently, pollute audio recordings. Virtual production equipment, such as computer, uninterrupted power supplies, power conditioners, and keyboards that support virtual

art departments' control bar personnel (a.k.a. Brain Bar) are often placed in front of a stage opening and will unwittingly generate equipment noise that can be picked up in the stage and recorded. (Zwerman & Okun, 2024, p. 207)

Automated Dialogue Replacement, ADR, is a costly and timely resolution, and capturing high-quality audio on set is as an important aspect of any film shoot as is the visuals (Rigney, 2022; Santos et al, 2023; Zwerman & Okun, 2024). To mitigate said issue, Zwerman and Okun (2024) present several solutions while warning readers that their effectiveness hinges on the conjoint efforts of several departments and pieces of equipment. Before shooting has commenced, film crews should make use of common materials for sound dampening to minimise sound reflections. Items, such as foam insulation, should cover as much of the set unseen by cameras as possible. The early adoption of the proposed methods is of importance (Rigney, 2022; Zwerman & Okun, 2024). Additionally, during filming, on-set personnel should remain to a minimum. Other practices such as appropriate and quality microphones are suggested for audio capture (Santos et al., 2023). Their placement is essential for sound recordings and avoiding interferences with cameras (Santos et al., 2023; Zwerman & Okun, 2024). Following the completion of the shoot, the appropriate scene files are chosen and forwarded for processing (Zwerman & Okun, 2024).

Additionally, in their article about the use of sound design during filming for a Virtual Production, Nelson-Tabor (2021) suggested that the application of such soundscapes can have positive effects on proper timing and responses from the actors. Nelson-Tabor (2021) stated that the recorded sound from production can be implemented into the final edit, as it would be supplemented by the same soundtrack.

2.2.1.3. Post-production.

The term *film soundscape* encompasses the combined utilization of sound elements in a movie to establish a distinct auditory profile that enhances the visual and storytelling aspects of the film. Sound design embodies the process of creating, choosing, and blending different audio layers such as dialogue, SFX, music, and ambience to amplify the emotional impact of a scene and evoke a specific atmosphere, setting, and mood (Santos et al, 2023). In order to create a balanced and immersive sound design, all sound layers need to be mixed. This is typically done in a digital audio workstation, DAW, where the sound elements can be spliced, edited, and arranged accordingly. Backed by top professionals, Pro Tools (Avid, 2024a) is considered the industry standard for DAWs. Its multimedia compatibility, interoperability, and diverse features allow for a collaborative approach to sound design (Avid, 2024a).

2.2.1.4. Unreal Engine. Audio designers have been using game engines to create soundscapes for video games since its inception. The need for an interactive and real-time

system, while also retaining precious RAM, gave birth to procedural sound design. In their book about game audio implementation, industry experts and university professors Stevens and Raybould stated that “[p]rocedural sound design is about sound design as a system, an algorithm, or a procedure that re-arranges, combines, or manipulates pre-existing sound assets so they might: a) produce a greater variety of outcomes (variation or non-repetitive design); b) be more responsive to interaction (parameterization)” (2016, p. xvi). They argued that simply mapping an audio file to a game event is not sufficient to create an immersive and realistic soundscape (Stevens & Raybould, 2016). Instead, game audio should respond to the game state and player actions in real-time, and generate varied and context-dependent sounds (Stevens & Raybould, 2016). Thus, procedural sound design comes into force. It uses algorithms and synthesis techniques native to the game engine to create dynamic and varied sounds based on the game state (Stevens & Raybould, 2016). Additionally, due to the simulated real-world physical properties of Unreal Engine (Kadner, 2019), the software is able to offer the same benefits for audio engineering as it does for asset and VE creation. The Unreal Audio Engine is a system in Unreal Engine which “provides tools and features that offer ways for audio designers and engineers to mold audio to match their visions” (Epic Games, 2024b). The Unreal Audio Engine allows sound engineers to import sounds and manipulate them through a series of parameterisation features to create the desired result, including spatialisation, attenuation, occlusion, and others (Epic Games, 2024b). These properties are discussed in Section 2.5. Moreover, Unreal Engine supports the use of a MIDI device, which can be used to control when a sound is played in the engine and to attribute parameters to a sound (Epic Games, 2024c).

As game engines are already a standard part of Virtual Production, their use introduces a creative consideration. Kadner prefaced this by stating that “[g]ame-changing technological advances over the years have altered and expanded the trajectory of filmmaking. These advances include sound for film” (2019, p. 3). Inherent features of the engine, such as the Sequencer, offer said advantages:

Sequencer is like a nonlinear editor, but one that goes far beyond setting in and out points of static clips. Sequencer forms the backbone of the animation workflow by defining the parameters of characters, visual effects, objects, cameras, and even sound effects across a timeline. It is highly interoperable with external non-linear editors (NLEs) and digital audio workstations (DAWs) for maximum flexibility. (Kadner, 2021, p. 97)

System features, such as procedural sound design and the Sequencer, offer the possibility to expand the use of audio in Virtual Production. Stevens and Raybould supported

this connotation by stating that “[p]rocedural audio is an increasingly important field, but one that requires its own tools and is worthy of its own study” (2016, p. xvi)

2.2.2. Acting in Virtual Production

As briefly mentioned in the introduction of this paper, Virtual Production using real-time in-camera visual effects allows all film crew members to have a shared frame of reference as it relates to the VE (Kadner, 2019; Kadner, 2021; Santos et al, 2023; Zwerman & Okun, 2024). This is especially beneficial for actors performing in Virtual Production, as they are able to see and feel where they are, and subsequently immerse themselves in the diegetic space (Kadner, 2019). Furthermore, Kadner (2019) argued that the realism of the VE projected on the LED screen is of great importance when seeking to enhance the sense of immersion. This is further supported by research conducted on the realism of VEs (Lombard & Ditton, 1997; Slater & Wilbur, 1997). Similarly, set-design is an extension of these and plays an equally critical role (Kadner, 2019).

However, the real-time rendering aspect of Virtual Production can cause lags or glitches which can also *disrupt* the performances of actors (Santos et al., 2023). A PhD dissertation from Bennett (2020) explored the perceptual experience of actors performing in Virtual Production. Bennett compared the current approaches in Virtual Production and investigated whether the implementation of this new method affected the quality and authenticity of the performances of actors. To test this theory, the researcher conducted a series of practical experiments through three cycles of practice. Bennett (2020) used various technologies and strategies to create and manipulate the virtual environment, such as motion capture, virtual reality, physical reference, and virtual reference. After each experiment, the researcher would plan, act, observe, and reflect, before moving on to the next cycle of testing. This is known as an action research approach (Kemmis & McTaggart, 1988). Following this, Bennett (2020) collected data from the experiments in the form of observations of participant behaviour and interviews with the actors of their perceived immersion. The researcher used content analysis to review the collected data. The analysis involved five steps: categorisation, abstraction, comparison, integration, and dimensionalisation. The results of the analysis identified eight conceptual classes that related to the way the actors experienced the virtual environment and character. These classes are: *corporeality*, *environment*, *imagination*, *immersion*, *performance*, *reference*, *spatiality*, and *virtual perception*. Bennett (2020) discusses how the conceptual classes were further refined and connected to existing theories to form three spectra of immersion: bodily immersion, spatial immersion, and perceptual immersion. These spectra represent the varying degrees of immersion that an actor can experience in Virtual Production. To conclude his analysis, Bennett (2020) proposed a new conceptual framework for creating an immersive performance environment for an actor in Virtual Production. The framework uses the spectra

of immersion as a diagnostic tool to determine and subsequently increase the level of immersion actors experienced. This was done through the use of various visual or auditory stimuli. The researcher noted that the use of ambient sound during one of the exercises, resulted in an increase in the level of immersion one actor felt in the VE. In the recommendations for future research, Bennett (2020) mentioned that the study focused solely on the use of visual stimuli for immersion in the VE and that the industry could benefit from further research into adoption of immersive technology to simulate sound.

2.3. Presence

2.3.1. Presence as a Concept

The pioneering paper from Lombard and Ditton (1997) defined the key concept of presence and outlined the physiological and psychological effects of presence on the media user. Lombard and Ditton (1997) opened their study with conflating the terms *natural*, *immediate*, *direct*, and *real* with a given mediated experience created by the use of technologies such as Virtual Reality, VR. A mediated experience is defined as a “conscious awareness and interpretation of external events and stimuli. Mediate experience provides meaning and additional information not contained in the event or stimuli itself” (American Psychological Association, 2018). The definition demonstrated the inherent introspection related to this concept; an individual first confers with their immediate experience, or the raw data received from their sensors, in order to then analyse the mediated experience and its effects (American Psychological Association, 2018). Lombard and Ditton (1997) presented six connected but unique conceptualisations of presence: *presence as social richness*, *presence as realism*, *presence as transportation*, *presence as immersion*, *presence as social actor within medium*, and *presence as medium as social actor*. The second conceptualisation of presence—presence as realism—concerns itself with “the degree to which a medium can produce seemingly accurate representations of objects, events, and people” (Lombard & Ditton, 1997). The researchers highlighted the difference between *social realism* and *perceptual realism*. Social realism represents the probability which a portrayed event reflects reality, whereas perceptual realism values the extent to which the content is life-like in quality (Lombard & Ditton, 1997). The following construct—presence as transportation—once again outlines three different types of transportation: *you are there*, one of the most recognised forms of presence, in which the user is transported to another place, typically a virtual environment (Lombard & Ditton, 1997). This leads to the suspension of disbelief, during which the senses of the user are completely absorbed, and they unequivocally believe that their body is in the simulated world (Lombard & Ditton, 1997). However, media scholars such as Black (2001) argued that this approach is based on the notion that audiences are merely

passive viewers of media rather than actively interpreting the mediated. In that sense, the media user requires consistent and conscious effort to be immersed in the content they engage with. Black (2001) suggests that a more effective approach to understanding audience engagement with media would be to focus on the ways in which audiences actively engage in their relationship with the environment. Lombard and Ditton (1997) continued by defining *it is here* as a type of transportation in which another place and the objects within it are transported to the user. This conceptualisation is used in discussion of television. Lombard and Ditton (1997) noted that “when media users fail to distinguish between image and referent, they respond directly to what they see and hear in a mediated experience” as if it were real. The fourth construct—*presence as immersion*—pointed to a distinction between the two terms, though often used interchangeably. Perceptual immersion emphasises the degree to which an individual feels that they are involved in the content (Lombard & Ditton, 1997). Furthermore, the medium provides the user with an experience which either results in presence or does not, and “the subjective feeling that a medium or media-use experience produces a greater or lesser sense of presence is attributable to there being a greater or lesser number of instants during the experience in which the illusion of nonmediation occurs” (Lombard & Ditton, 1997). The paper by Slater and Wilbur (1997), contrastingly, differentiated between the concepts of immersion and presence in another sense, while simultaneously unifying the conceptualisations presented by Lombard and Ditton (1997):

Immersion is a description of a technology, and describes the extent to which the computer displays are capable of delivering an inclusive, extensive, surrounding, and vivid illusion of reality to the senses of a human participant. Inclusive (I) indicates the extent to which physical reality is shut out. Extensive (E) indicates the range of sensory modalities accommodated. Surrounding (S) indicates the extent to which this virtual reality is panoramic rather than limited to a narrow field. Vivid (V) indicates the resolution, fidelity, and variety of energy simulated within a particular modality. (Slater & Wilbur, 1997, pp. 604-605)

Supposing that immersion is an objective quality that a technological medium delivers to the user, then presence is the resulting state of that; a sense of being a part of the virtual environment (Slater & Wilbur, 1997). As such, Slater and Wilbur directly oppose Lombard and Ditton (1997) by viewing presence as a scalable function of immersion.

The unifying link between the conceptualisations described above is the use of a medium (Lombard & Ditton, 1997). Presence cannot occur without a medium to deliver it, as the user relies on said aspect to assimilate their olfactory senses (Lombard & Ditton, 1997),

and therefore, presence is synonymous with the interaction with some form of a VE (Slater & Wilbur, 1997). Slater and Wilbur (1997) described a *barrier* or threshold that needs to be crossed in order to go from the real into the virtual; it has become a representation of something familiar but ultimately, the virtual is still computer generated. Lombard and Ditton (1997), however, observed several considerations related to media users and their presence across different mediums: “mediated experiences that closely mimic nonmediated ones cause difficulties for the reality-monitoring process so that when memories are retrieved, mediated and nonmediated experiences are confused”. These effects can have negative connotations depending on the type of content being viewed. As such, each medium brings on its own challenges and differs across individuals (Lombard & Ditton, 1997; Slater & Wilbur, 1997).

2.3.2. Importance of Sound

Although severely underestimated, mediated sounds are essential in delivering presence (Lombard & Ditton, 1997). Epic Games (2024b) supported this claim by stating that “[s]ound is vital to creating believable and immersive environments. From ambient sounds to interactive sounds of vehicles or weapons, from music cues to spoken dialog, audio in a game can make or break the user experience”. As mentioned previously, the perceptual needs of media users differ across individuals and across different mediums (Lombard & Ditton, 1997; Slater & Wilbur, 1997; Haggis-Burridge, 2020). In that respect, the context of the experience and the quality of materials are important when attempting to induce feelings of presence (Altman, 1992; Lombard & Ditton, 1997; Slater & Wilbur, 1997). Along with quality of materials, Lombard and Ditton (1997) described sensory breadth— “the number of sensory dimensions simultaneously presented”. They argued that the more senses are occupied by the medium, the greater the presence (Lombard & Ditton, 1997). In that regard, media that produces both audio and video feeds is considered more immersive compared to audio-only or video-only (Lombard & Ditton, 1997). Furthermore, Lombard and Ditton (1997) asserted that “our visual and aural senses dominate our perception and have been most often identified with presence,” indicating that greater importance should be given to those two aspects of proprioception.

The same is true in terms of auditory stimuli: “[f]or one person the absence of auditory information might be a crucial hindrance, whereas for another it might be hardly noticeable” (Slater & Wilbur, 1997). Lombard and Ditton (1997) built on this statement by identifying two characteristics of sound in relation to presence: quality and dimensionality. Similarly to visual quality, sound quality relies on attributes such as frequency range, dynamic range, and existence of noise (Lombard and Ditton, 1997). It is speculated that higher quality sounds are more likely to generate presence than lower quality, however, Lombard and Ditton (1997) pointed to an inclusive answer on the matter. They presented a study in which participants

were shown scenes of a movie with a varied degree of audio quality; the experiment concluded that, although the higher fidelity audio generated a more realistic view of, it was the low fidelity sounds that immersed the audience in the film scenes (Lombard and Ditton, 1997). Slater and Wilbur (1997) described an experiment in which participants were grouped based on the quality of audio they would hear: real-world sounds produced by the laboratory environment, white noise generated by the head-mounted device, speakers, nondirectional sound generated by the speakers, and spatialised directional sound. Slater and Wilbur (1997) further mentioned an experimental study which explored the effects of sound on subjective presence:

spatialized sound was introduced or not into a visual VE. In the second study, the comparison was between non-spatialized sound and spatialized sound. In each case there was a significant effect on presence—spatialized sound led to a higher reported presence than both no sound and nonspatialized sound. (p. 608)

The study determined that the greatest amount of presence was delivered through the use of white noise, indicating that it isolated the subjects from the real-world environment. The paper questioned the overwhelming focus on the visual modality, suggesting that pervasive and largely nonconscious ambient background sounds may play a crucial role in situating individuals in the VE (Slater & Wilbur, 1997).

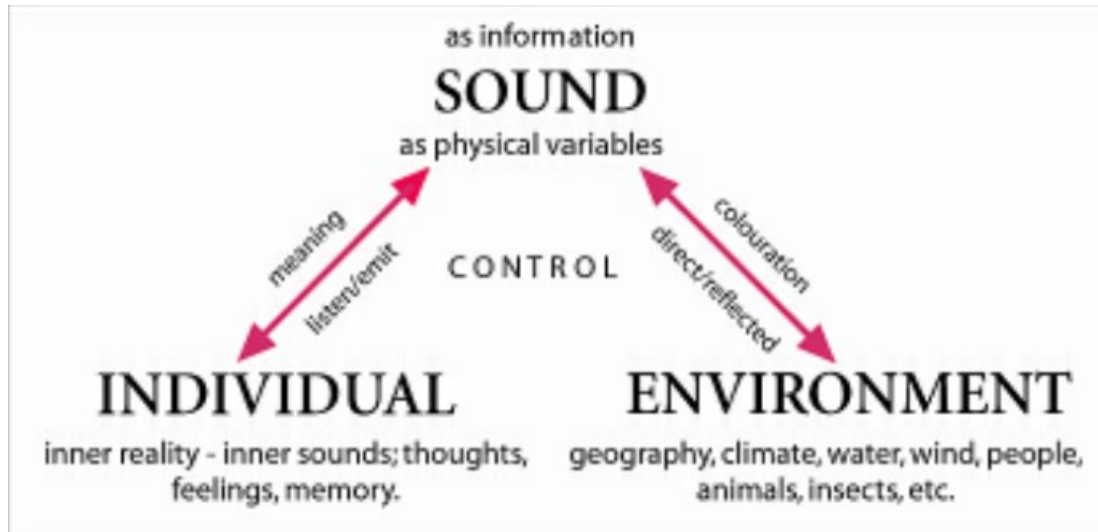
Lombard and Ditton (1997) continued their discussion on the dimensionality of sound, speculating that since humans hear in three dimensions, these spatial properties of audio should be deemed valuable in evoking a sense of presence. Spatial characteristics such as changes in frequency and reverb are part of aural realism and spatialisation attempts to bring them into mediated experiences, which can be facilitated through the use of specialised equipment (Lombard and Ditton, 1997). These properties of sound are discussed in Section 2.5. However, Lombard and Ditton (1997) attested that there is little evidence to support this constation, only that multi-speaker systems were found to induce a greater feeling of presence over single speaker systems. Nevertheless, the volume of mediated sounds was found to pose an impact on presence, “with particularly low and perhaps particularly high levels [being] less effective than moderate (realistic) levels” (Lombard & Ditton, 1997). Furthermore, the use of ambient sounds and music was concluded to enhance the sense of immersion in the VE (Lombard & Ditton, 1997). In contrast, Nazemi and Gromala (2012) argued that repetitive background sounds and technological interferences in the form of hissing had the opposite effect and can therefore, negatively affect levels of immersion.

In their study from 2012, Nazemi and Gromala spoke on emerging trends in the audio sphere where sound is becoming a model element of the virtual environment through use of

procedural sound design. Building on the idea of how sound gives information and meaning to the listener (as developed by Traux, 1984), Nazemi and Gromala asserted this important relationship and its relevance for sound design in VEs.

Figure 4

Exchange of Sound Information Between Listener and Environment (Nazemi & Gromala, 2012)



They outlined two modes of listening—background and foreground—stating that “foreground sounds is meant to be listened to while middle-background sounds are to be heard on a subconscious level” (Nazemi & Gromala, 2012, p. 17). Nazemi and Gromala (2012) found this distinction important, as it mediates the level of attention needed from the actor. Furthermore, as the state of the user is changing depending on the elements they are interacting with, Nazemi and Gromala (2012) stated that the proposed framework seen in Figure 4 had to be configured to prioritise sound cues. Furthermore, the diagram shows that the role of the listener is pivotal in the exchange of auditory information. Their level of engagement and attentiveness to the sounds within the environment can greatly influence the effectiveness of sound as a communication tool, especially in VEs (Nazemi & Gromala, 2012). In actuality, the relationship between the listener and the environment is formed by the combination of sounds, ultimately creating the soundscape (Nazemi & Gromala, 2012). This can then create a form of mediated experience through the audio playback, which, according to Nazemi and Gromala (2012) transforms the environment into a *performance space*. Regarding dimensionality, Nazemi and Gromala attested that proper spatialization of sound within a VE can significantly enhance the sense of presence and immersion of the listener.

2.3.3. Quality Perception

Similarly to how the quality of sound and medium are relevant for increasing sense of presence, so are they important for the perception of quality of content. Haggis-Burridge (2020) projected an increase in preference for visual excellence among audiences as higher-fidelity graphics becoming the norm. Consequently, worlds with less detail and lower framerates may start to appear more artificial, emphasizing the importance of visual quality in crafting immersive experiences (Haggis-Burridge, 2020). However, the role of sound in these experiences is equally crucial. Zwerman & Okun (2024) have argued that the quality of sound significantly influences audience perception of visual effects and virtual production. SFX, as Santos et al. (2023) noted, play a pivotal role in film soundscapes. In the context of game environments, which often imitate or present hyperreal versions of real-world environments, players come with clear expectations of what these environments might sound like, based on their lifetime of experience in the physical world. Even in fantasy settings, there are expectations about the way sound will behave. While realism might not always be the desired goal, the soundscape needs to be consistent and believable to support the verisimilitude, “the appearance or semblance of truth and reality”, of the experience (Stevens & Raybould, 2016, p. 227). When discussing audio characteristics, Lombard and Ditton (1997) stated that even low fidelity sounds evoked feelings of presence in the diegetic world within audience members. This observation underlines the importance of in shaping audience perception. Rojas (2012) presented a study in which a series of experiments were conducted to determine the effects of background sounds on the visual quality perception in virtual simulations and serious games. The results of the experiments led to the conclusion that the quality perception of a given virtual model is dependent on ambient sound and ambient music, whereas ambient white noise was found to decrease it (Rojas, 2012). Furthermore, contextual auditory cues lead to the greatest increase in visual quality perception observed in the experiments (Rojas, 2012). These findings, however, once again add to the conflicting data on which types of sounds are best suited for immersing media users and enhancing visual quality of said content.

2.3.4. Measuring Presence

According to Lombard and Ditton (1997), some types of presence conceptualisations can be measured through close-ended questionnaires or statements which allow respondents to rank their agreeability of each one, while others rely on qualitative methods, such as the self-report of participants. Each question was asked in relation to the specific conceptualisation, such as presence as transportation or presence as realism (Lombard & Ditton, 1997). This was corroborated by Slater and Wilbur (1997) who suggested that presence can be measured suggestively through an open-ended questionnaire. Additionally, Lombard and Ditton (1997) noted that observation can be a helpful tool in determining level

of immersion. In this case, the researcher looks for physiological reactions from media users, such as flinching, audible responses, or a strong emotional reaction (Lombard & Ditton, 1997). Overall, Lombard and Ditton (1997) stated that there was no standardised approach to measuring presence. They ushered for the creation of an instrument, specifically developed for conducting subjective measures of presence through the use of a questionnaire.

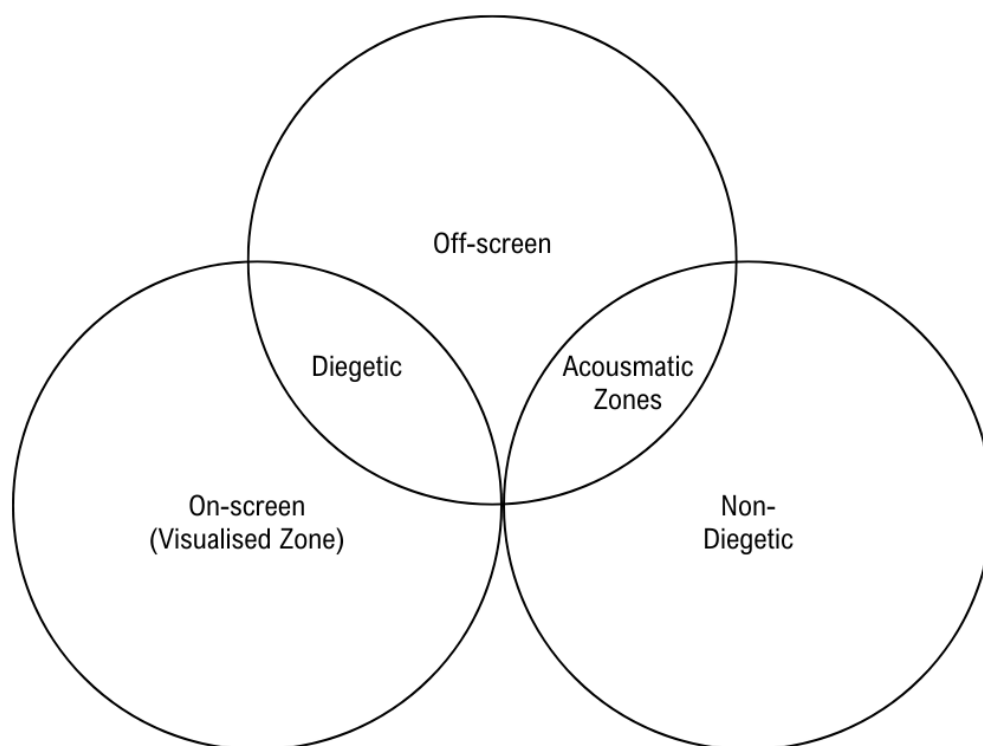
2.4. Properties of Sound

2.4.1. Diegetic and Non-Diegetic Sound

Within the *world* of the film, there are several categories of sound effects that comprise the soundtrack.

Figure 5

Visualisation of the Film Soundspace (Adapted from Chion, 2019)



On-screen sounds refer to whose “source is physically present within the scene being shown on the screen” (Santos et al., 2023, p. 101). This is otherwise called the visualised zone, in which the viewer can hear and see the sound source (Chion, 2019). The off-screen audio elements refer to any sounds whose source is not visible to the viewer (Santos et al.,

2023). Together with the on-screen sound, they form the diegetic sound space—the sound space within the world of the film—which can be “heard by the characters on-screen and are part of the scene’s reality” (Santos et al., 2023, p. 101). The last categorisation is non-diegetic sound, which contrasts the diegetic sound, and it refers to all sounds that are not part of the world of the film. Together with the off-screen sounds, they form the acousmatic zone—sounds that can be heard, though whose source cannot be seen. A visualisation of how these audio elements overlap is shown in Figure 5. Within the sound categorisations described above there are different audio elements that can be used to build the soundscape of a film. These include SFX, dialogue, music, environmental sounds and ambiance.

2.4.2. Sound Spatialisation and Parameterisation

In the attempt to replicate realistic environments, considerations need to be made regarding the preconceived notions of the listener, as they expect for sound elements to behave similar to their real-world counterpart (Lombard & Ditton, 1997; Stevens & Raybould, 2016). Raw sounds alone give little information to the listener; it is their inherent parameterisation due to the space they were produced in and heard that give sound its unique qualities (Altman, 1992; Lombard & Ditton, 1997). These, however hard, can be replicated through the use of DAWs or game engines (Stevens & Raybould, 2016; Epic Games, 2024).

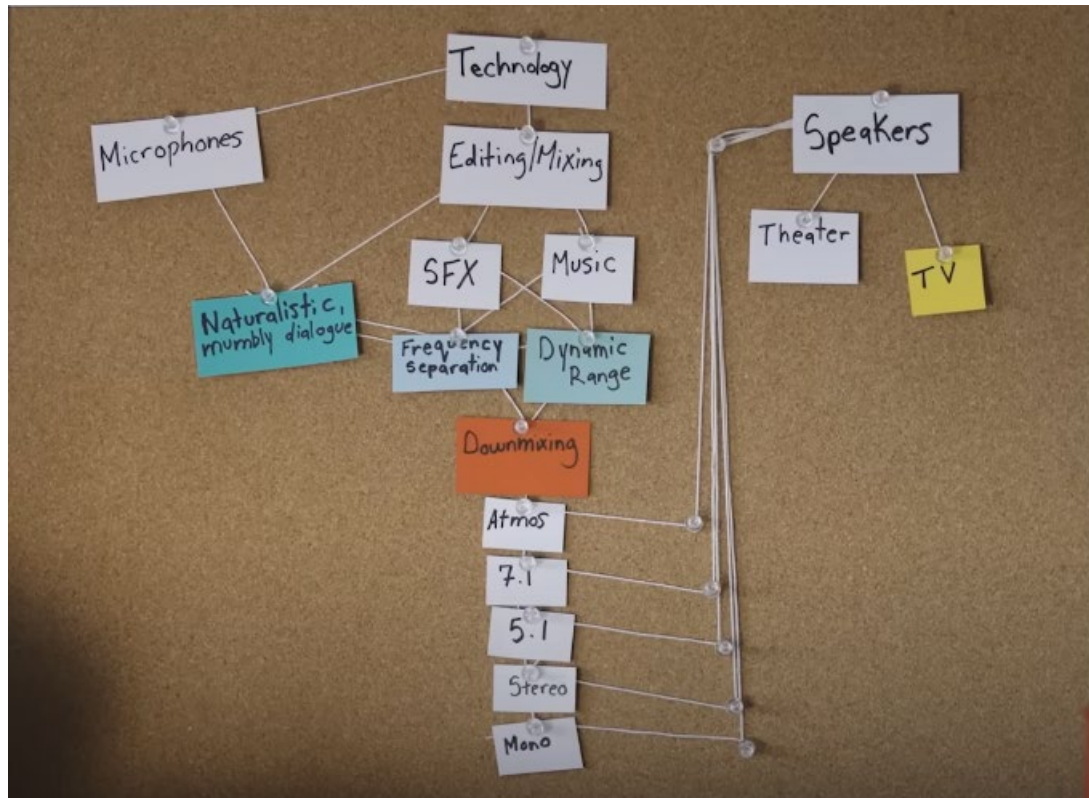
Sound spatialisation, or dimensionality, as previously referred to in this research, is one of these customisable features. In terms of video games, Stevens and Raybould (2016) claimed its existence is “a matter of life and death”, as the majority of the game sounds are happening off-screen (p. 233). As such, spatialisation can provide valuable information about the VE and where the player is situated based on their relative position to the sound source. Furthermore, “[d]eciding what is appropriate for each sound and faking the physics of how sound behaves in the natural world is an important task in building convincing and effective audio environment” (Stevens & Raybould, 2016). An advantage of using game engine technology to produce 3D sound is that the system implements these parameters on its own due to the real-world physics implemented into the software (Stevens & Raybould, 2016; Kadner, 2019). Additionally, since the sound elements are normally bound to a fixed object or point from which they emanate, the game engine takes the relative positioning of the user and their respective field of view and adjusts the playback depending on the playback system configuration. Spatialisation and parameterisation of sound are closely linked together and can hardly exist without the other. This is demonstrated by Epic Games (2024d), who defined spatialisation as “[t]he simulation of location-based sound phenomena such as orientation, attenuation, propagation, obstruction, and reverb”. In that sense, they provide information to the listener that inherently contains spatialised data of the sound event.

Though all of these are under the umbrella term of spatialisation, they are also their own adjustable parameters of sound.

Sound propagation refers to “the way sound travels through air (and other substances) and reflects around an environment” (Stevens & Raybould, 2016). Though often conflated, reverberation, or reverb, is different to propagation. Reverb is defined as “[t]he persistence of a sound after the sound is produced”, and as such is *dependent* on the sound propagation (Epic Games, 2024d). It can reveal acoustic information about how large a given space is as the sound waves travel back to the listener (Stevens & Raybould, 2016; Epic Games, 2024d). Reverb is created as the sound bounces off a surface, causing those reflections to decay—“the duration it takes for reverb to fade away” (Avid, 2024b).

2.4.3. Hardware for Production and Playback

Edited together by Rick Altman in 1992, *Sound Theory/Sound Practice* was recognized for “dramatically broadening the previous field of research on sound” (Routledge, 2024). The book was divided into three distinct parts and combines articles from academics and industry professionals. It covered the theory behind sound in cinema, the development of sound in cinema throughout history, as well as sheds light on sound practices that had been left unexplored at the time of publication. The book largely focused on cinema as an event, in which the film and its accompanying sound should not be scrutinised outside the context, both historical and technical, of which it was written, produced, and viewed. Altman (1992) argued that sound is heterogeneous in its composition and should also be looked at as a separate event. They deepened this understanding by uncovering its three-dimensional qualities, in which sound is no longer regarded as a single phenomenon (Altman, 1992). Not only can sound not exist in a two-dimensional area, but it can also not exist without a sort of context being applied to it by the listener, what Altman called spatial signature (1992, p. 24). As the sound is recorded it captures the unique three-dimensional space it was processed in, and the unique properties of the hardware used to record it. Following, it is interpreted in the context of the three-dimensional space it is played back in, capturing the qualities of the playback device as well. As a result, each sound carries distinctive and recognisable characteristics of its sound space, “existing only in the separate stories of various perceivers of the original event” (Altman, 1992, p. 24). Indicating that the experience is different for every perceiver based on their relative location to the source of the sound, and whether any obstructions that would absorb or reflect the sound are present. All of this is subconsciously interpreted by the listener, and it affects their sense of presence and immersion in the content.

Figure 6*Sound Design Pipeline (Vega, 2023)*

In film production, audio equipment, such as microphones and sound recorders, is used to capture high-quality audio on set (Santos et al., 2023). Altman (1992) stated that no microphone is capable of recording a completely realistic sound, as it will always have an imprint of its individual sound space and the specific attributes of the microphone used to record it. As such, the microphone is not an impartial actor in the sound recording process and is part of the sound narrative. Altman (1992) went beyond this point by suggested that sound in cinema is only a memory of its originator and that the recordings merely serve as “access to the sound of the past” (1992, p. 27). This statement, however, does not undermine the importance of the sound recordings, nor their quality. Instead, it demonstrates the complex properties of sound and its role in movies. A pipeline of the sound design for movie production is shown in Figure 6. However, over time, audio equipment has evolved to the point where it no longer impedes the recording process and high-fidelity audio has become a standard in capturing performances (Vega, 2023).

Altman (1992) continued naming actors in the audio flowchart, the playback system that is used to hear the recorded sound being one of them. Sound sources also consist of several types: mono, stereo, and multichannel audio, with the latter encompassing a variety of playback systems (Stevens & Raybould, 2016). The way these are set-up can drastically affect effective sound spatialisation and subsequent immersion (Lombard & Ditton, 1997).

2.4.4. *Dynamic Sound Range*

Altman (1992) emphasised that the sound record might not be able to capture the depth of the three-dimensional space the sound was produced in, unless it is in stereo, and even then, the placement of the microphones play an important role. However, some audio engineers might choose to intentionally diminish the intelligibility of the recorded dialogue through the microphone placement in order to preserve the spatial signature of the original sound event. The loyalty which Altman (1992) has to the recording of an accurate spatial signature might result in a loss of intelligibility in the dialogue, although it does, however, enhance the level of perception the listener has of the sound event. This process describes the dynamic sound range—the range between the quietest sound and the loudest sound (Vega, 2023). Similarly, Vega (2023) critiqued the increasingly unintelligible dialogue in Hollywood film, which suggests that this might be due to a need to widen the dynamic range to allow for the louder sounds and quieter sounds to exist in the same timeline.

Nazemi and Gromala (2012) made a similar remark in their discussion of background and foreground listening modes when attempting to convey importance of sound elements. “Therefore, when considering volume levels for sound cues in VEs, we must consider the balance between background and foreground sounds and create clear pockets in which information can be mediated,” depending on its significance to the content (p. 18). A film soundscape serves as a conduit for information exchange between the listener and their surroundings, where the complexity of this soundscape plays a crucial role in this exchange (Santos et al., 2023). A well-balanced and intricate soundscape can facilitate effective communication, while a chaotic or noisy one can obstruct it. Noise, particularly when it's intense, can be a significant disruptor in this context. It can mask the informative elements of sound, thereby hindering the communication process (Santos et al., 2023). Therefore, the presence and intensity of noise within the environment are critical factors to consider.

2.5. Conclusion

The Literature Review identified key aspects from each of these three themes governing the research topic at hand. It discussed Virtual Production industry practices regarding sound design. It considered what is established on the concept of presence, uncovering a need for more convergence of resources. Furthermore, it presented relevant research on the effect sound has on immersion. The chapter concluded with a comprehensive outline of the inherent properties of sound and their production in the sound space. The interplay between sound and visuals, and the role of sound effects in particular, is crucial in creating immersive, engaging, and believable experiences for the audience (Lombard & Ditton, 1997; Santos et al., 2023). All of the above informed the subsequent chapter of the paper.

3. Methodology

3.1. Introduction

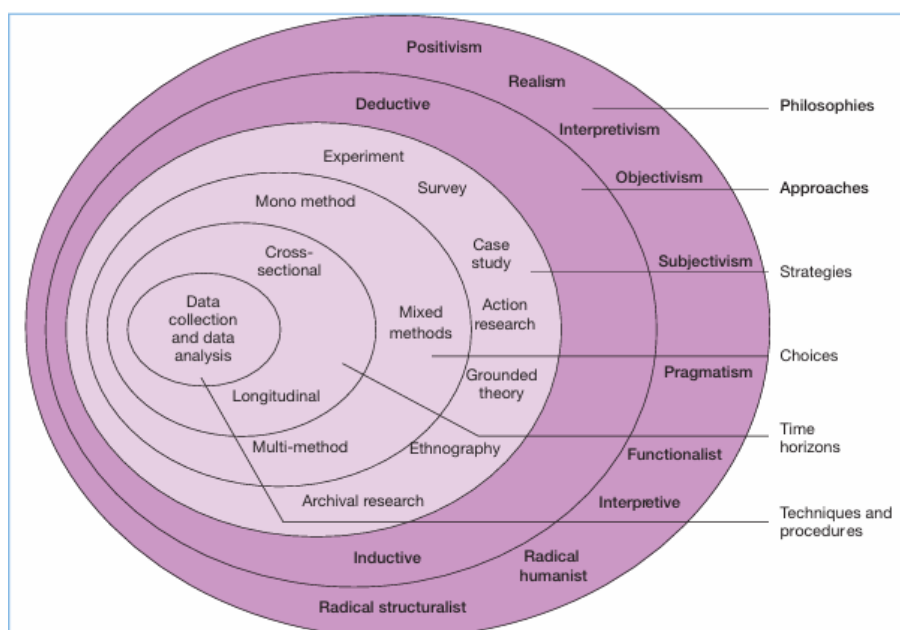
This chapter of the research report describes the assumed methodology utilised to reach the research objectives outlined in Section 1.2. In developing the research design for this study, the author heavily drew on the works of Bennett (2020), as both studies are rooted in measuring presence and immersion of actors in Virtual Production shoots. More detail about the specifics of his PhD thesis is provided in Section 2.2.2. Inspired by the phenomenological paradigm Bennett defined, this paper closely aligns with the described theoretical framework, which consequently informed the data collection and data analysis procedures. The underlying theories and reasonings for the chosen approach are thoroughly explained from Section 3.2 to Section 3.5.

3.2. Research Design

The methodological design of this research paper was informed by the research *onion* as defined by Sanders et al. (2007). They argued that before the author can concern themselves with data collection and data analysis techniques, they must first *peel away* all the layers of the onion—starting with the research philosophy. The separate layers are shown in Figure 7. The author adopted the research onion structure, which allowed for extensive coverage of each aspect of the research design of the paper and the coherent presentation of said information. Furthermore, this composition enabled a detailed explanation of the research philosophy, which is foundational for the report.

Figure 7

The Research Onion (Saunders et al., 2007)



3.2.1. Research Philosophy

3.2.1.1. Theory. The initial layer of the onion focuses on research philosophy. The chosen approach was fundamental in building the rest of the research strategy, as it describes the core beliefs of the researcher, the way that they experience reality and perceive knowledge (Saunders et al., 2007). These foundational beliefs not only shaped the manner in which the author collected and analysed data, but influenced, ultimately, how they constructed knowledge from and about the research topic (Saunders et al., 2007). Regardless of whether the research objective seemed limited, it still contributed to the development of new knowledge (Saunders et al., 2007). Knowledge goes beyond mere facts; it encompasses the process of understanding and the confidence in what people claimed to know. Furthermore, it forms the foundation for informed action. In social research, the pursuit of truth concerns itself with the extent to which the understanding of a social phenomenon aligns with its actual reality (Matthews & Ross, 2010).

Saunders et al. (2007) addressed three major approaches to theoretical perspectives: epistemology, ontology, and axiology. Epistemology refers to the theory of knowledge; it determines “what can be regarded as knowledge about a social phenomenon and considers what sort of knowledge it is acceptable to use to help (...) study that phenomenon (...)” (Matthews & Ross, 2010, p. 26). Whereas ontology refers to “the way the social world is seen to be and what can be assumed about the nature and reality of the social phenomena that make up the social world” (Matthews & Ross, 2010, p. 23). The third major philosophical inquiry is axiology, which studies “judgements about values” (Saunders et al., 2007, p. 110). Assuming that ontology refers to the question *What is real?*, and epistemology - *What is known?* - then axiology refers to the question *What ought to be?* (Deane, 2018).

3.2.1.2. Application. Within each of these 3 pillars of philosophical underpinnings, there are several stances an author can assume to obtain what they would determine as credible data. However, there stands a divide in belief systems amongst researchers, that of an objective versus a subjective reality. Researchers who believe that there is no one objective or shared reality that humans experience, and rather a closed loop where meaning is inferred from interacting with the world and the world takes on meaning because of those interactions, might concur with an interpretivist approach (Saunders et al., 2007; Bell et al., 2019). As defined by Saunders et al., interpretivism is “an epistemological approach which studies a social phenomenon which has no external reality” (2007, p. 103). In the same manner, ontologically, this paper aligned most with a subjectivist view, as the author believes that “social phenomena are created from the perceptions and consequent actions” of the participants (Saunders et al., 2007, p. 108). Otherwise called *constructionism*, subjectivism “follows from the interpretivist position that it is necessary to explore the subjective meanings motivating the actions of [participants] in order for the researcher to be able to understand

these actions” (Saunders et al., 2007, p. 108). As it stands to reason, different people will experience a phenomenon differently based on their worldview. By adopting this position, the author assumed that any potential similarities found between interviewee testimonials bear significance for that constructed reality and can be employed to draw meaning from it (Saunders et al., 2007). For this reason, both interpretivism and constructionism make a direct link to the philosophy of phenomenology (Saunders et al., 2007; Bell et al., 2019; Neubauer et al., 2019). Section 3.2.2. expands on the use of phenomenology in this study.

Although it is often disregarded (Deane, 2018), Saunders et al. (2007) argued that axiology plays a crucial role in the research process by guiding the choices and judgments of the researcher at every stage. In order for the research to be meaningful, credible, and ethically grounded, it is essential that it is conducted with an understanding of the values held by the author. Axiologically, the values held during the execution of this research report were based upon delineating the experience of the interviewed participants, whereby the author was able to establish a clear rapport with the subjects and maximised the information shared. More on this topic can be found in Section 3.3 and Section 3.4. Additionally, it was of great importance that all data was sourced ethically and contributed to the industry and the research conducted by others. This is discussed further in Section 3.6.

3.2.2. Research Paradigm

3.2.2.1. Theory. A paradigm can be defined as “a cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, how research should be done, how results should be interpreted” (Bryman, 1988, p. 4) as cited by Matthews & Ross (2010, p. 34). Paradigms bridge the gap between epistemology, ontology, and axiology, as it creates a theoretical framework, through which lens the researcher addresses the topic at hand (Saunders et al., 2007; Matthews & Ross, 2010). Within the realm of social science, there are various categorisations of paradigms; this research paper will make use of a phenomenological paradigm - an approach in qualitative research that aims to characterise a phenomenon as it appears to an individual in their lived experience (Gill, 2020). Across the philosophy of phenomenology, there are several phenomenological methodologies, however, at their core, they are all seek to narrate the experience of the participant as it relates to the phenomenon and determine what factors have influenced its onset (Gill, 2020).

The two major approaches to phenomenology are transcendental (descriptive), as founded by Husserl, and hermeneutic (interpretive), as developed by Heidegger. Philosopher Edmund Husserl is regarded as the pioneer of phenomenology. His work aimed to understand a phenomenon at its most rudimentary state, suspended from any assumptions, beliefs, or hypotheses (Neubauer et al., 2019). The transcendental approach coined by Husserl requires a series of reductions, the first of which known as *bracketing*, whereby the researcher must set aside all these preconceived notions in order to arrive at the essence of

a given phenomenon (Neubauer et al., 2019; Gill, 2020). In direct opposition to the aforementioned method, Martin Heidegger, inspired by the work of his professor, developed interpretive phenomenology. As suggested by its denomination, interpretive phenomenological methodologies focus on interpreting meaning from the relationship between the participant and their lived experience (Neubauer et al., 2019). Heidegger claimed that the “self and world belong together in the single entity, the Dasein” (1988, p. 297) as cited by Gill (2020, pp 73-94). It is further stated that the researcher cannot be separated from the research process, as initially suggested by Husserl, but that they are part of it—a participant of sorts—and not free of bias (Neubauer et al., 2019; Gill, 2020).

Neubauer et al. assert that “understanding the ontological and epistemological assumptions underpinning [phenomenological] approaches is essential for successfully conducting phenomenological research” (2019, pp. 90-97). Moreover, Gill (2020) argued that by selecting one type of phenomenological philosophy, the researcher prevents the application of other methodologies. They suggested that the author should rather aim to “establish if their assumptions more closely align with Husserl, Heidegger, or a combination of different phenomenological philosophers” (Gill, 2020, pp. 73-94). One point of distinction that should be made is of the different requirements for sampling, data collection, and data analysis, the choice of which should be dependent on the nature of the research objectives and limitations (Gill, 2020).

3.2.2.2. Application. For the purpose of this study, the investigated phenomenon was centered on the level of immersion of the participant in the virtual environment as facilitated by added real-time diegetic SFX. As this research aims to explicate the self-reported level of immersion of the participants, it is expected of the author to draw on those recounts to denote significant insight about the phenomenon. Heidegger argues that people are always recognising and experiencing their own existence, and thus cannot accurately separate themselves from their past experiences (Neubauer et al., 2019; Gill, 2020). While descriptive phenomenology requires a level of detachment, it is precisely the notion that the immersion of the actors would enhance upon the addition of the real-time diegetic SFX which led to the conception of this research report. Inasmuch as, this study, *au fond*, hinges on the expectation that the actors will be able to relate the given scenario to others where the audibly enhanced process is not being implemented. Moreover, recognition in similar academic texts as outlined in the literature review of this paper prompted the author to explore audio stimuli further. Given these factors, the research report aligned itself most closely with an interpretive phenomenological approach, which informed the rest of the research design.

In the field of hermeneutic phenomenological philosophy, there are three big names that preceded Heidegger and built on his theories—van Manen, Benner, and Smith. The

technique known as Interpretive Phenomenological Analysis (IPA) was originally developed by Jonathan Smith and has gained significant popularity in the field of psychology (Gill, 2020). IPA sets out to “explore in detail how participants are making sense of their personal and social world” (Smith & Osborn, 2003, p. 53). Additionally, IPA

involves detailed examination of the participant’s life world; it attempts to explore personal experience and is concerned with an individual’s personal perception or account of an object or event, as opposed to an attempt to produce an objective statement of the object or event itself. (Smith & Osborn, 2003, p. 53)

As stated previously, the dilemma of which phenomenological methodology should be utilised necessitates the researcher to consider their individual circumstances (Gill, 2020). The choice of IPA was made based on the notion that

IPA is a suitable approach when one is trying to find out how individuals are perceiving the particular situations they are facing, how they are making sense of their personal and social world [...] especially [...] when one is concerned with complexity, process, or novelty. (Smith & Osborn, 2003, p. 55)

This statement speaks to the novelty of the research topic, given the scarcity of literature on the use of audio in Virtual Production—particularly its impact on immersion—as well as to its alignment with the objectives of this study.

3.2.3. Research Approach

3.2.3.1. Theory. As a research approach, induction requires the researcher to collect data and develop a theory as a result of their data analysis, whereas the opposite is true for deduction (Saunders et al., 2007). Saunders et al. stated “[t]hat theory may or may not be made explicit in the design of the research” (2007, p. 117), although such labelling is potentially misleading and of no real practical value, as the theory will most likely be made apparent by the presentation of the findings and conclusions. However, it is useful to attach the research approach to the different research philosophies as it will subsequently affect the way the research is conducted; Saunders et al. (2007) claimed that the choice of the inductive approach would best align with the interpretivist philosophy of this research paper. Although the research topic lacks existing literature and would benefit from the theory building of the inductive approach; this study neither presents a hypothesis nor rejects a foundational theoretical framework, as necessitated by the deductive approach. Thus, an abductive approach was employed to conduct this research.

3.2.3.2. Application. Abductive reasoning, similar to the aforementioned approaches, is “used to make logical inferences and build theories about the world” (Bell et al., 2019, p.

24). It has gained popularity in the research field as it attempts to remedy the flaws of both inductive and deductive approaches (Bell et al., 2019). In their 2013 paper, Mantere and Ketokivi discuss several research approaches, arguing in favour of abduction in interpretive research as a “legitimate methodology” (p. 81). Mantere and Ketokivi continued by stating that “[t]he process of interpretive research can be described as a *reflexive narrative*, where researchers seek—through a dialogue between their own preunderstanding and the empirical data—a new understanding of theory through an evolution of their own understanding” (2013, p. 82). Moreover, the interpretive philosophy blended with an abductive reasoning is “methodologically founded on the cognitive view; the normative and the prescriptive criteria thus converge” to determine the course for analysis (Mantere & Ketokivi, 2013, p. 82). This assertion links to applications of phenomenology in this study, specifically IPA. By assuming “a chain of connection between people’s talk and their thinking and emotional state [...] IPA can be described as having cognition as a central analytic concern” (Smith & Osborn, 2003, p. 54). Additionally, IPA does not seek to verify a preconceived hypothesis, and rather to investigate an area of interest thoroughly and in a flexible manner (Smith & Osborn, 2003).

3.2.4. Research Strategy

3.2.4.1. Theory. Once more, Saunders et al. underlined that to match strategies to a single approach is overgeneralized, though some strategies evidently belong to the abductive approach (2007). The different outlined strategies are not mutually exclusive and can be applied interchangeably to fit the needs of the researcher (Saunders et al., 2007; Matthews & Ross, 2010). However, it stands to reason that the research strategy should be consistent with the research philosophy (Saunders et al., 2007). A case study is defined as “a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real-life context” (Robson, 2002, p. 178) as cited by Saunder et al. (2007, p. 139). Multiple methods can be employed to collect data, but it is always analysed in great detail and depth (Matthews & Ross, 2010). Yin (2003) defines several types of case study strategies; a single case is applied when it provides the researcher “with an opportunity to observe and analyse a phenomenon that few have considered before” (as cited by Saunders et al., 2007, p. 140). Matthews and Ross (2010) went on to say that the constraints of the case and what is to be studied are defined by the research topic. Consequently, that definition is made because of its potential to generate data which will address the research question directly. Quasi-experiments, meaning literally *almost experiments*, hold similarity with the experimental design but are lacking one or more of its essential criteria. Nevertheless, the point of a quasi-experiment is to collect data about a social situation. There exist a variety of quasi-experiments, the most popular of which including some form of a comparison between a control group and an experimental group

(Matthews & Ross, 2010; Bell et al., 2019). Although often discounted, there is a possibility to conduct a quasi-experiment without the use of a control group as a basis for comparison (Bell et al., 2019). Bell et al. suggested that these complications might be remedied “by seeking out further information that will help to discount some of the rival interpretations of a causal link that arise from the lack of a true experimental design” (2019, p. 57).

3.2.4.2. Application. Though in the traditional employment of case studies “the boundaries between the phenomenon being studied and the context within which it is being studied are not clearly evident” (Saunders et al., 2007, p. 139), in the case of this research the context is clearly defined. As mentioned in Section 1.2, the aim of this paper is to determine the level of immersion actors experience in Virtual Production, hinging on the use of real-time diegetic SFX. Therefore, the setting for this study would be during a Virtual Production shoot. For this reason, the aforementioned strategy was combined with a quasi-experimental design. The quasi-experiments conducted for this research paper were held during Virtual Production shoots. The author played a set of SFX which were synchronised to the VE. Section 4 thoroughly explains the steps involved in establishing said experimental shoots. In respect to this study, participants compared their own experiences of the application of real-time diegetic SFX to no added sound at all during filming—their neutral state playing the role of the control group. This is to say that the actors compared the unmediated experience to the mediated experience (Lombard & Ditton, 1997). This design raises issues over the control and extent of the manipulation in the experiment, negating the idea of generalisation (Bell et al., 2019). However, that is not the intended outcome of IPA, it sooner aims to create a detailed analysis of interviewee testimonials (Smith & Osborn, 2003). Therefore, the use of semi-structured interviews and interpretive analysis is an appropriate selection for the methodological design of this paper. Section 3.7 delves deeper into the concerns regarding internal validity.

3.2.5. Research Choice

3.2.5.1. Theory. The research choice is determined by the research topic and the type of data needed to answer the research question (Saunders et al., 2007; Matthews & Ross, 2010). A singular data collection method and equivalent data analysis procedure is referred to as *mono-method*. The word *qualitative* is used to describe any data collection methods and data analysis procedures which produce or use non-numerical data (Saunders et al., 2007).

3.2.5.2. Application. As made apparent by the philosophical underpinnings of the methodology, this research paper aligns with a qualitative research method. In accordance, Matthews and Ross argued that “qualitative data is typically gathered when an interpretivist epistemological approach is taken and when the data collected is the words or expressions

of the research participants themselves” (2010, p. 142). This is further evidenced by the use of IPA, which “employs in depth qualitative analysis” (Smith & Osborn, 2003, p. 54).

3.2.6. Time Horizon

3.2.6.1. Theory. The term *time horizon* refers to the time the research project spans over; a cross-sectional study looks at a particular point in time (Saunders et al., 2007). Despite most cross-sectional studies adopting a survey strategy, they may also use a qualitative method (Saunders et al., 2007; Matthews & Ross, 2010). The logic of comparison is once again emphasised through the application of a cross-sectional study. Matthews and Ross supported this claimed by stating that cross-sectional studies are “likely to be looking at people’s expressed history or reporting on their experience and opinions, and comparing the different characteristics of their experience and the outcome or current state” (2010, p. 121).

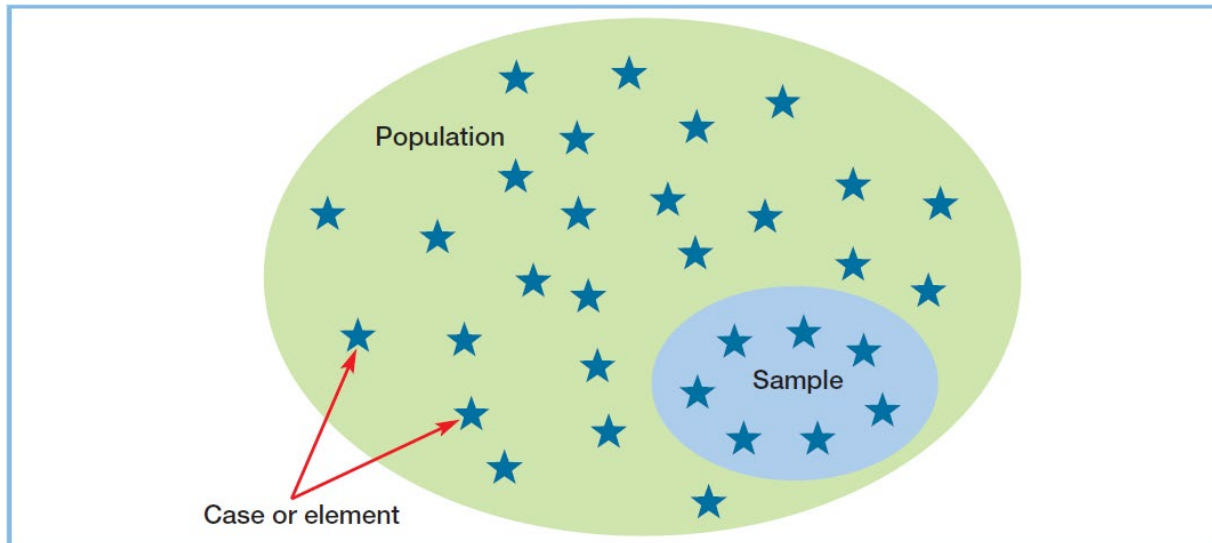
3.2.6.2. Application. Though the level of comparison is not on a scientific level, the focus of this research is still on the possible relationship between how the participants viewed and were affected by the addition of the real-time diegetic SFX during the Virtual Production shoots and the lack thereof. The determination of a cross-sectional study bridges over to the use of IPA, and its thematic analysis, as “the differences [in the data] may be explored through the identification of themes and the relationship between these and emerging groups within the data” (Matthews & Ross, 2010, p. 122). Additionally, sampling for this study design can be done purposefully (Matthews & Ross, 2010).

3.3. Research Sample

The entire collection of cases from which a sample is taken is referred to as *the population* (Saunders et al., 2007). The process of selecting specific cases from the population from which to collect data is known as *sampling*. This technique is demonstrated in Figure 8. In the case of non-probability samples, the probability of selecting each case from the total population remains unknown, thus rendering statistical interpolations regarding the characteristics of all cases impossible. Purposive sampling is a non-probability sampling technique that allows the researcher to select cases that will enable them to answer their research question (Saunders et al., 2007). According to Saunders et al., this method is most effective when working with small, highly informative cases (2007). One of the more common purposive sampling strategies is *homogeneous* sampling. This strategy is centred on a specific subgroup, all sample members of whom are similar, allowing for a detailed analysis of said subgroup (Saunders et al., 2007). Sampling techniques are still, however, largely dictated by the unique constraints of the researcher, their questions and objectives, and the chosen research approach and method (Saunders et al., 2007; Matthews & Ross, 2010). Regarding this research, the population was then all actors, and the sample group was actors in Virtual Production productions.

Figure 8

Population, sample, and individual cases (Saunders et al., 2007)



Phenomenological approaches typically employ small sample sizes—this is often a point of contention in phenomenology, as findings will not and cannot be generalised to a larger population (Ayton et al., 2023). Regardless, that is not the intended outcome of IPA, as stated previously (Smith & Osborn, 2003). Additionally, phenomenological studies operate with homogenous and purposive samples (Gill, 2020). The use of IPA is in line with the abovementioned sampling strategy. Smith and Osborn, however, argued that the idiographic nature of IPA “separates it from most phenomenological methodologies”, showing the possibilities of “single case studies where a single participant is used” (Gill, 2020, p. 83). Effectively, Smith and Osborn view this as an advantage, stating that “because [data] has been derived from the examination of individual case studies, it is also possible to make specific statements about those individuals” (2003, p. 56). Overall, IPA researchers aim for uniform research sample, identifying a narrowly defined group for whom the research question is relevant.

In the search for participants of this study, a pattern emerged amongst the selected ones; all three participants were educators at the university level, had previous experience working with Virtual Production tools, and had some acting background. These formed the outlined subgroup from which data was collected. Moreover, the number and the nature of the participants was largely determined by the scheduled Virtual Production shoots accessible to the author and the individuals available to partake in those. The limitations are discussed at length in Section 1.5. Nevertheless, Smith and Osborn claimed that “for students doing IPA for the first time, three is an extremely useful number for the sample”

(2003, p. 57). This seemingly small number “allows sufficient in-depth engagement with each individual case but also allows a detailed examination of similarity and difference, convergence and divergence” (Smith & Osborn, 2003, p. 57). Given the interpretive nature of this paper, it is worth mentioning that the author assumed an active role in this study alongside the participants—as expanded in Section 3.2.1 to Section 3.2.3. This was not taken lightly, as IPA is “a dynamic process with an active role for the researcher in that process” (Smith & Osborn, 2003, p. 53). The playback of the real-time diegetic SFX during production was also facilitated by the author, who further instructed the subjects prior to filming. The specifics of the experiments leading up to the data collection are outlined in Section 4.

3.4. Data Collection Methods

Matthews and Ross define a research tool as “the means by which data is collected” (2010, p. 181). In qualitative research, the most common method to collect data is through an interview— “a purposeful discussion between two or more people” (Saunders et al., 2007, p. 310). The collection of new or *primary* data requires the researcher to adopt an active role in the process (Saunders et al., 2007). The collected data from said interviews would then be deemed primary.

As the main goal of IPA is to obtain a robust account of how participants experience the world, it requires a flexible method for achieving that (Smith & Osborn, 2003). Consistent with the qualitative methodological design of this paper, IPA researchers commonly employ semi-structured interviews as their data collection instrument (Smith & Osborn, 2003; Gill, 2020). Smith & Osborn argued that “[t]his form of interviewing allows the researcher and participant to engage in a dialogue whereby initial questions are modified in the light of the participants’ responses and the investigator is able to probe interesting and important areas which arise” (2003, p. 57). This dynamic data collection tool allows the interviewer to be guided by a *schedule* of overarching themes, while simultaneously engaging with the responses of their interviewee. By contrast, semi-structured interviews take longer to conduct and are harder to analyse. In addition, the relaxed nature of this method forces the investigator to forfeit a portion of their control over the situation (Smith & Osborn, 2003). The absence of a rigid script, however, allows the participant to introduce issues the researcher would not have otherwise considered (Smith & Osborn, 2003). Smith and Osborn insert that “doing this sort of work is often iterative rather than linear” and that the practitioner might over time change their view on what the schedule should cover (2003, p. 60).

Once the researcher has determined the areas within their topic to be investigated, they must place them in the most suitable order (Smith & Osborn, 2003). Smith and Osborn believed it is more appropriate to leave the more sensitive and crucial topics towards the end

of the interview to allow the subject to become predisposed to sharing the necessary information (2003). In like manner, funnelling may be employed by the interviewer—a technique meant for “eliciting both the respondents’ general views and their response to more specific concerns” by structuring the interview schedule as a funnel (Smith & Osborn, 2003, p. 62). The interview schedule for this paper was formed similarly. The author began with an exposition to the topic and the previous acting experience of the participants, followed by their perceptions of Virtual Production tools, their level of immersion in the virtual world through only the use of visual stimuli, before leading into questions about the use of real-time diegetic SFX during the experimental productions.

For the formation of appropriate interview questions, Smith and Osborn advised against very specific, leading, or closed questions (2003). They argued that this may result in biased data, though if the participant is struggling to elaborate on or understand the question, prompts can be used to urge them on (Smith & Osborn, 2003). The literature review informed the conception of some of the interview questions. The full list of questions utilised to conduct interviews for this study is provided in Appendix A.

Furthermore, Smith and Osborn noted the importance of forming a connection with the respondent in order to probe their “psychological and social world” (2003, p. 59). The author attempted to create a bond with the participants prior to the experiments and data collection process. The location of the interview should also be taken into consideration, as different settings can impact the emotional and mental disposition of the subjects (Smith & Osborn, 2003). On account of time and convenience, one interview was held through an online call, while the remaining two were conducted at the commissioning institution. Transcripts from said interviews can be found in Appendix B. Moreover, Smith and Osborn recommended making use of recordings, as it is impossible to capture the nuances of a, typically one-hour-long, interview through notes alone (2003). Subtleties, such as tone of voice, pauses in speech, and corrections captured in the recordings, provide fuller data and subsequent analysis (Smith & Osborn, 2003). Overall, Smith and Osborn believe that the researcher should rely on their own discretion when administering the interview—specifically pointing to the usage of redundant questions and responding to the non-verbal communication cues from the subjects (2003).

3.5. Data Analysis Procedures

The data analysis procedure is known as the “process of working with the data to describe, discuss, interpret, evaluate and explain the data in terms of the research question” (Matthews & Ross, 2010, p. 317). This is a necessary part of conducting research, as demonstrating the data alone is simply not enough—analysis is always required (Matthews & Ross, 2010). Saunders et al. promote the use of a theoretical framework which will guide the

researcher in their data analysis (2007). However, Bell et al. contend that excessive codification of analytic procedures is undesirable, and that broader guidelines are to be preferred (2019). Following the guidelines outlined by Smith and Osborn (2003), the use of IPA aligns with this approach to data analysis.

As implied by its title, IPA research hinges on the data analysis procedures. Rooted in the phenomenological philosophy, this paper employed thematic analysis—one of the most widely used strategies of qualitative data analysis (Bell et al., 2019). A thematic analysis is defined as “a process of segmentation, categorisation and relinking of aspects of the data prior to final interpretation” (Grbich, 2007, p. 16) as cited by Matthews & Ross (2010, p. 373). Criteria for identifying what the central themes are repetitions of topics, similarities and differences between the interviews, and the use of linguistic connectors that “point to casual connections in the minds of participants” (Bell et al., 2019, p. 519). All of these will provide the author with a foundation for the conception of a theoretical contribution to the research topic (Bell et al., 2019). However, as reiterated several times in this paper, IPA strives to “say something in detail about the perceptions and understandings of this particular group rather than prematurely make more general claims” (Smith & Osborn, 2003, p. 55). Any findings presented will, in other words, only be true for the particular subgroup surveyed. Furthermore, Smith and Osborn argued that deriving meaning from the statements made by participant is at the core of understanding their worldview, and the researcher should not necessarily aim to measure their frequency in the transcript (2003). They support this claim by stating that it is the quality of the supportive claims made by the participants that is valued over the repetition of certain themes (Smith & Osborn, 2003).

The analytical procedures began with the transcribing of the recorded interviews. This stage was time-consuming, given that Smith and Osborn recommended extrapolating as much of the data through the written account as possible; any pauses, re-starts, and body language should be included (2003). It is further stated that for every one hour of interview, the author should provide five to eight hours to transcribe it (Smith & Osborn, 2003). However, Bell et al. argued that “the researcher must try to avoid being overly captivated by the richness of the data collected such that they are unable to interpret the data’s broader significance” (2019, p. 518).

It is important to acknowledge the fundamental interpretive philosophy of this paper when approaching the data analysis. This is critical as Smith and Osborn adopt a “two stage interpretation process” or a “double hermeneutic”—a process by which “[t]he participants are trying to make sense of their world; the researcher is trying to make sense of the participants trying to make sense of their world” (Smith & Osborn, 2003, p. 53). The own conceptions of the author will then affect the data analysis, as stated previously.

Smith and Osborne outline four key steps of IPA: *looking for themes in the first case, connecting the themes, continuing the analysis with the other cases, and writing up* (2003, pp. 67-76). First, the researcher carefully reads one transcript to familiarise themselves with the text. Then, they search for insights, annotating significant points in the left-hand margin (Smith & Osborn, 2003). Smith and Osborn underline that there are no rules about the number of comments that can be made, as some parts of the transcript will be richer than others (2003). Once they have completed this process for the whole of the transcript, the author returns to the beginning and uses the right-hand margin to establish emerging themes amongst the comments (Smith & Osborn, 2003). Smith and Osborn point to a key aspect of this step in the process; “the skill at this stage is finding expressions which are high level enough to allow theoretical connections within and across cases but which are still grounded in the particularity of the specific thing said” (2003, p. 68).

Second, the researcher attempts to find connections amongst the themes, clustering together some, while others form subordinate concepts. While doing so, the researcher consults the first-hand account of the participants to ensure the overarching themes are consistent with their claims. Following, the researcher constructs a table of these themes, noting down specific instances from the transcript that support their emergence (Smith & Osborn, 2003).

Third, the researcher utilises the emergent themes from the first transcript to guide the analysis of subsequent transcripts or they may start the process anew with the second transcript (Smith & Osborn, 2003). The author chose for the latter option as to avoid the creation of a confirmation bias from the data. It is interesting to note that the iterative nature of IPA points to an underlying holistic approach; through the reflexive writing, the researcher works towards a robust and nuanced analysis in which the data (or the parts) contribute to an evolving understanding of the phenomenon at hand (the whole) (Gill, 2019). The main issue of this step is allowing for the development of new themes (Smith & Osborn, 2003). Smith and Osborn contended that the researcher should “recognise ways in which accounts from participants are similar but also different” (2003, p. 73). After each transcript has been analysed, a final table of superordinate themes is created. The decision of which themes to include should be based not on their frequency within the data, but on their backing from respondent insights (Smith & Osborn, 2003).

Fourth, the outcome of the analytical process is a concluding statement which outlines the meanings inferred from the experiences of the subjects (Smith & Osborn, 2003). This step is about creating a “narrative account” by using “verbatim extracts from the transcript to support the case” (Smith & Osborn, 2003, p. 76). Careful consideration is taken when linking findings to testimonials, and the researcher might even wish to expand further

on their claims. This once again points to the iterative fashion of IPA. Smith and Osborn (2003) claimed that,

consistent with its phenomenological origins, IPA is concerned with trying to understand what it is like, from the point of view of the participants, to take their side. At the same time, a detailed IPA analysis can also involve asking critical questions of the texts from participants, such as the following: What is the person trying to achieve here? Is something leaking out here that wasn't intended? Do I have a sense of something going on here that maybe the participants themselves are less aware of? (p. 53)

When making claims, the author should, therefore, be conscious of these underlying thought patterns that arise within the respondents.

Smith and Osborn (2003) advised a presentation of the findings, as well as a separate discussion which links them to the literature. The findings extrapolated from the data are presented in Chapter 5. Additionally, all documentation made for the purpose of the data analysis can be found in Appendix B.

3.6. Ethical Considerations

In research, *ethics* concern “the appropriateness of your behaviour in relation to the rights of those who become the subject of your work, or are affected by it” (Saunders et al., 2007, p. 178). Though this paper was not submitted or reviewed before the Research Ethics Board of Breda University of Applied Sciences, several people, including the graduation project supervisor and other senior researchers, were consulted on the potential risk the study posed. They found no grounds to suspect this report would pose any harm to the parties involved. Nevertheless, respective considerations were made to ensure that the research was conducted ethically. It is important to note that this paper adopted a deontological viewpoint, which emphasises the inherent nature of the research, rather than judging it based on the outcome (Saunders et al., 2007). Within this approach, there is a level of duty expected to be upheld by the author (Duignan & Britannica, 2024). To uphold the duty towards the research community and media industry, the author conducted fair research, did not use deception to obtain the data, nor simulated any responses. Due to its novelty, there is an expectation within the Virtual Production community to facilitate collaboration and exchange of information, as well as to provide beneficial insight into new findings. Co-destiny and cooperation are of particular importance in this sense (Scholz, 2019). The relevance of this paper is discussed in Section 1.4.

The research practices were additionally guided by the Diversity and Inclusion Plan from the hosting university. In their report, Breda University of Applied Sciences (2022) outline their goals of maintaining diversity and inclusion throughout each facet of the institution. However, no specific effort was made to include women, non-binary people, or people of colour in this study, as the participants were divided not by such classifications, but by their trade as actors.

Most critically, the author of this study considered the right to privacy, informed consent, confidentiality, and anonymity of the participants. This is evidenced by the use of participant consent forms, which can be found in Appendix C. They outline the exact purpose of the collected data and inform the respondents of the procedures that will be taken to preserve their anonymity. Concurrent with these practices, each interviewee was given an alias when referring to their individual transcripts and subsequent insights. This allowed the author to maintain the confidentiality of the participants, while easily identifying and categorising important information (Saunders et al., 2007). Furthermore, the duty to accurately represent the experiences of the actors was not taken lightly, as the report hinges on the mindful interpretation of their words. Considerations of participant sensory issues were also made in hopes of mitigating a negative reaction towards loud and unpleasant SFX during the test shoots.

All procedures held in the name of this research paper adhere to the Netherlands Code of Conduct for Research Integrity (NOW, 2018), which is upheld by the alma mater.

3.7. Issues of Trustworthiness

3.7.1. Reliability

The research design of this paper produced some qualms about the reliability of the study. Reliability refers to the ability of the data collection techniques or analysis procedures in yielding consistent results (Saunders et al., 2007). In respect, potential sources of error, such a participant error and bias, and observer error/bias in this study, were addressed through various methods. Related to the time between the quasi-experiments experiment and period of data collection, participant errors were remedied by showing participants behind-the-scenes footage to excite memory recollection, as well as added question following the completion of the semi-structured interviews regarding whether the participants felt that they could adequately recall their experiences during the Virtual Production shoots. As all three participants are educators and involved with the commissioning company, the author anticipated the desire of the subjects to aid in reaching the research objectives and whether they might feel an obligation to give the anticipated responses. This issue was remedied by delving into the specific details—convergence and divergence—of each

subject's own interpretation and personal anecdotes. The observer error/bias in this paper was linked to the manner in which data was collected and analysed. The use of IPA was a key aspect of mitigating this issue as it focuses on a detailed and meticulous analysis of the transcriptions. This however poses issues about the validity of the results.

3.7.2. Validity

As defined by Saunders et al. “[v]alidity is concerned with whether the findings are really about what they appear to be about” (2007, p. 150). During the test shoots which predated the data collection, the author shared the objectives of the project with the participant. During filming, the subjects were instructed to react to the diegetic SFX as they deemed appropriate. It is speculated that the actors could have overreacted because of the nature of the situation, thinking that it was necessary or that the instructions were too rigid. In order to mitigate that, the researcher did not compare creative outcomes, instead used the individual experiences of the participants to determine their level of immersion. For the purpose of this study, it is not necessarily the acting quality that is valued, rather how the actors felt in the moment upon hearing the added audio.

In the same manner, an appropriate data collection methods and data analysis procedures were adopted. As the author sought to collect a robust and nuanced account from the participants, a qualitative methodology informed by a phenomenological paradigm was adopted. Phenomenology is often criticised for its ability to produce non-generalisable data (Ayton, 2023), however, it allowed the author to precisely delve into the individual experiences of each actor. Saunders et al. (2007) warned that a researcher should be conscious of the assumptions they carry forward in their research. Though, as mentioned in Section 3.2.2, it is insights from relevant literature that inspired the conception of the research report. Furthermore, the use of phenomenology negated the assumption that the author is able to conduct research without a bias of their own. Hence, the employment of hermeneutic phenomenology was a key tool in embracing this aspect of the process.

The assumed analytical model—IPA—presented challenges of its own. Smith and Osborn (2003) stated that “there is no single, definitive way to do IPA” (p. 54), which renders it “more of a craft than a technique or scientific method” (as criticised by Giorgi, 2010; as cited by Gill, 2020, p.83). Due to its flexible guidelines, IPA raised issues whether it can truly be employed correctly to produce quality data. In turn, this presented issues of replicability, as different researchers and their respective approaches would generate dissimilar findings. The technical set-up of the experiments was described in the attempt to bridge this gap. Nevertheless, the context of this research was highly specific and IPA was utilised to investigate a number of particular cases. Following, the approach was used to produce a table of central themes that govern the implementation of real-time SFX during Virtual Production. Smith and Osborn (2003) stated that these themes are not based on their

frequency of repetition within the text, rather the strong inclination as supported by quotes from the actors.

3.7.3. Generalisability

Generalisability is a concern of “whether your findings may be equally applicable to other research settings” (Saunders et al., 2007, p. 151). Most qualitative studies struggle with this aspect, as they tend to yield individual findings (Saunders et al., 2007). As mentioned previously, the lack of generalisable results is a common critique of phenomenology, as they are considered “too subjective and therefore invalid” (Ayton, 2023). Additionally, IPA was used to analyse the detailed transcripts from interviews with participants. A core trait of IPA is that it is committed to the interpolation of in depth data and does not aim to generalise any results (Smith & Osborn, 2003). As such, scholars attested that it can sensibly only be replicated with a small sample, adding to the issues of generalisability (Smith & Osborn, 2003). On the topic of sample sizes, Smith and Osborn (2003) declared there is no appropriate amount and is dependent on the unique constraints of the researcher. These research limitations are outlined in Section 1.5. However, three is a sufficient number for students conducting IPA research for the first time (Smith & Osborn, 2003). Though these considerations are all valid, Saunders et al. (2007) argued that, since the main objective of this study is not to generalise findings, then it presents no issues to the reliability or validity of the findings.

3.8. Conclusion

In conclusion, this research adopted a comprehensive and rigorous approach to explore the impact of real-time diegetic sound effects on the levels of immersion actors experience in Virtual Production environments. The study was grounded in an interpretivist and constructionist philosophy, recognizing the subjective nature of the social phenomenon and the importance of understanding individual perspectives of the participants. The study utilized IPA for data analysis, focusing on in-depth qualitative analysis. This approach enabled the exploration of distinctive experiences and the identification of themes within the data. The study adhered to ethical considerations, ensuring privacy and informed consent. Additionally, all procedures adhered to the Netherlands Code of Conduct for Research Integrity. While the research faced challenges related to reliability, validity, and generalizability, these were addressed through various methods and considerations. The findings, though specific to the sample group, provide valuable insights into the phenomenon of immersion in virtual production environments.

4. Quasi-Experimental Test Shoots

4.1. Introduction

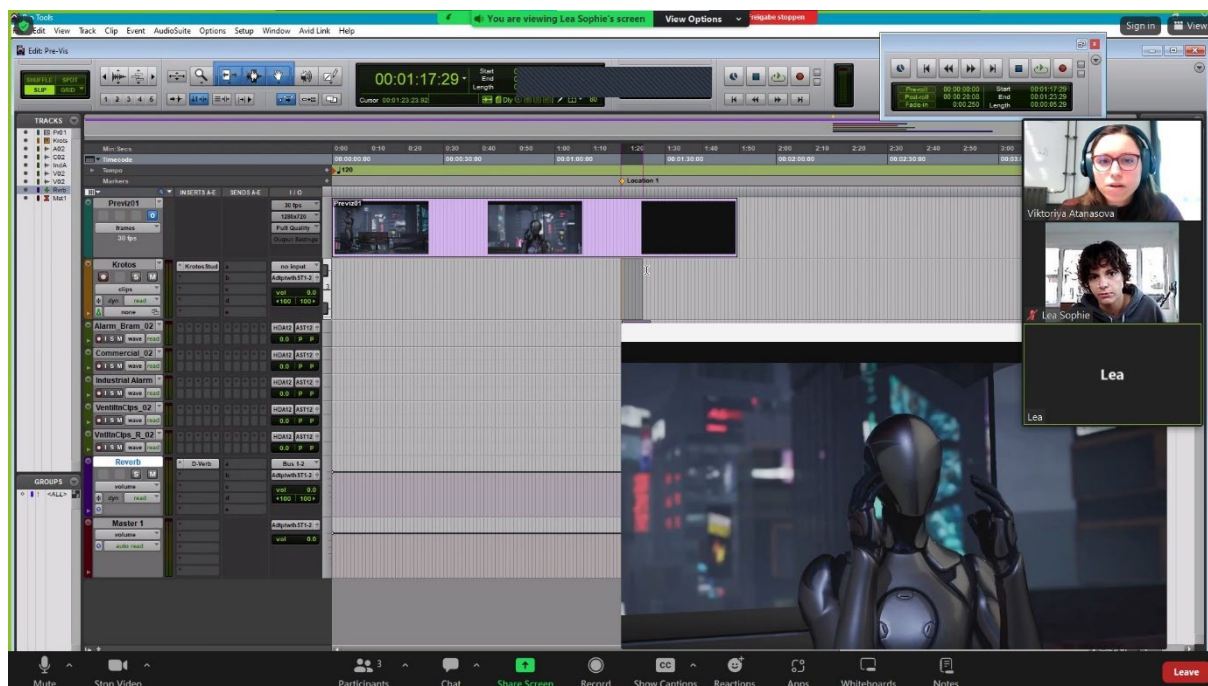
As mentioned in Section 1.2, the aim of this paper is to investigate the effect real-time diegetic SFX sustain on the level of immersion actors experience in a Virtual Production. Therefore, the study conducted a series of quasi-experimental test shoots for the purpose of facilitating the data collection processes, the justification for which is described in Section 3.2.4. This chapter outlines the steps taken to conduct said Virtual Productions, which served as a base for comparison during participant interviews. The operational procedures closely align with the Virtual Production workflow outlined in Section 2.2.1. Additionally, the chapter mentions the necessary software utilised to reproduce the diegetic SFX, as well as the essential equipment operated for successful audio playback.

4.2. Procedures

Preparations for the Virtual Production shoots began with a revision of the script. A detailed script breakdown was made, indicating potential sound design elements that could be implemented in the final edit. These suggestions included both diegetic and non-diegetic SFX. The document with adjacent notations can be found in Appendix D. Based on the script, a previs was produced in Unreal Engine (Epic Games, 2024) and exported as a video file. Subsequently, as showcased in Figure 9, a soundscape was created in Pro Tools (Avid, 2024a). The output of said edit is located in Appendix E.

Figure 9

Sound Engineering in Pro Tools

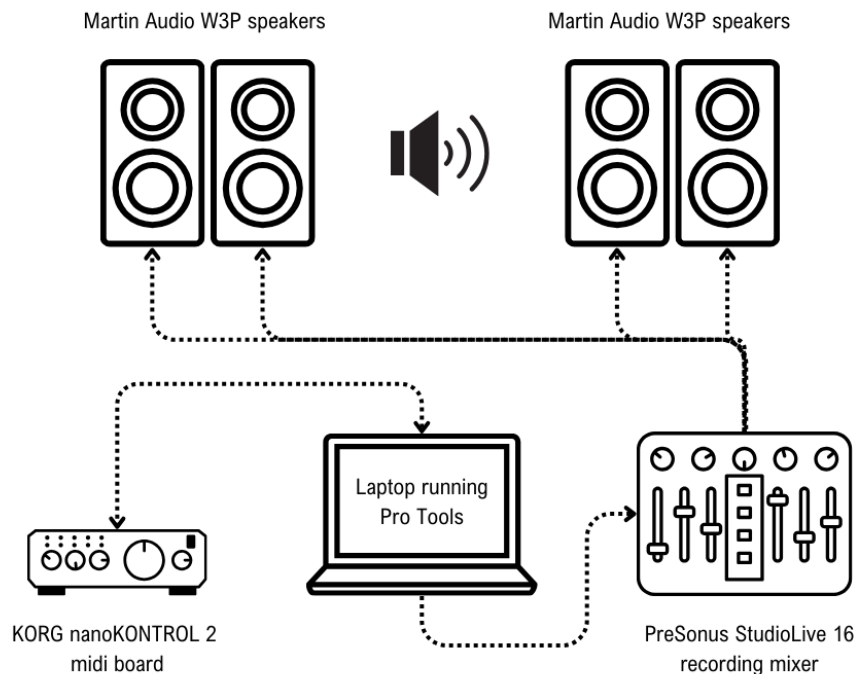


From the sound design curated for the previs, specific diegetic SFX were chosen to enhance the Virtual Production shoot: a billboard commercial and a sports-car drive-by. Each SFX was exported with spatial information, such as reverb, already incorporated. The two key sounds were chosen based on parameters established in the Literature Review, the implications of which are discussed in Chapter 5.

On set, the author of the study gave minimal instructions to the actors in terms of their expected response to the audio playback to avoid influencing their performances. During filming, the diegetic SFX were played in real-time. A laptop running the Pro Tools software (Avid, 2024a) was connected to a nanoKONTROL 2 MIDI board (KORG, 2024), which allowed for the two chosen diegetic SFX to be placed on separate tracks of the controller. The laptop was then connected to a StudioLive 16.0.2 USB recording mixer (PreSonus, 2024), that transmitted the signal from the MIDI controller to the speakers. For this purpose, two sets of two Martin Audio W3P speakers (2024) were utilised. The speakers were placed on either corner of the LED ceiling at the volumetric stage, which provided the actors with audio. A diagram of the sound system used for playback can be seen in Figure 10.

Figure 10

Sound System Diagram for Playback



Each shot of the Virtual Production that involved the playback of the diegetic SFX was carefully synchronised to the movement of assets in the VE to best deliver an immersive experience to the actors. Several takes were made to give each performer a solid basis for

comparison for the anticipated data-collection. In the case of issues related to the playback, the author utilised a Web MIDI test page (n.d.) to determine whether the device output and input were detected functioning appropriately.

4.3. Conclusion

This chapter illustrated the preparation and execution of the quasi-experimental test shoots in Virtual Production predating the data collection. The process began with a script breakdown to identify sound design elements. A previs and soundscape were created using Unreal Engine (Epic Games, 2024) and Pro Tools (Avid, 2024a), respectively. Specific diegetic SFX were selected and played in real-time during filming in attempt to enhance the perceptual experience of the actors. Several technologies facilitated the integration of these sounds, and multiple takes were made for data comparison. The chapter set the precedent for further discussion in Chapter 5.

5. Discussions

5.1. Introduction

The chapter leads with the discussions of insights drawn from the literature which did not otherwise fit into the scope of the Literature Review. Additionally, it presents a discussion of the findings extrapolated from interview transcripts. The analysis was conducted using IPA, as founded by Smith and Osborn (2003), who suggested that results and interpretations were presented jointly in a single chapter.

5.2. Discussion of the Findings

In order to respect and maintain the anonymity of the participants in this study, all participants will be referred to using pseudonyms. These pseudonyms are assigned based on the chronological order the interviews were held and bear no relation to the real names or any other identifiable characteristics of said participants. This measure was taken to ensure the privacy and confidentiality of the participants, which was of utmost importance in this research. Additionally, these aliases are condensed to acronyms for ease of use, in which Participant 1 is referred to as P1, Participant 2 as P2, and Participants 3 as P3.

As mentioned previously, all three participants are university educators and have previous experience working with Virtual Production tools to varying degrees. Furthermore, both P1 and P3 are retired theatre performers, who occasionally choose to act in student-led productions, whereas P2 has no prior or formal education in acting and only acts in student-led productions out of necessity. This is to say that despite their background differences, there are converging aspects of the subjects of this study.

The interview schedule resembled a funnel, starting with the broader topics, such as background information on the participants, leading into their general thoughts and practices as actors in Virtual Production, before addressing the core of the discussion—the implementation of the diegetic SFX during filming and the experiences of the subjects. This was applied in order to ease the respondents into the conversation, such that they would be actively recalling their experiences of the quasi-experimental test shoots by the end of the interview and feel comfortable sharing this information (Smith & Osborn, 2003). The pre-prepared questions used during the semi-structured interviews with the participants were primarily drawn from the works of Lombard and Ditton (1997), Slater and Wilbur (1997), and Bennett (2020). They were all different iterations on concepts related to presence and immersion, which at times appeared to be questioning the same angle but were ultimately making an important distinction. The full list of questions, including prompts, a feature suggested by Smith and Osborn (2003), can be found in Appendix A. Furthermore, the

transcripts generated from the aforementioned interviews are presented in Appendix B, including any notes taken during the analytical procedures.

5.2.1. Preparing for Role

5.3.1.1. Script. The interviews began with an introduction into the different steps each participant takes when preparing for a role. Naturally, all actors indicated that they begin this process by reading the script. Similarly to the production pipeline shown in Figure 3, While preparing for a Virtual Production, participants found it important that the storyline of the character is realistic and tethered to the plot of the scenes being shot. This aspect is similar to what Haggis-Burridge (2020) named as narrative or sequential immersion. Though traditionally it is concerned with the desire of the media user to continued on their exploration of the VE, the sensation can be “driven by traditional story-based events revolving around physical and/or emotional conflicts” (Haggis-Burridge, 2020, p. 7). This is to say that the level of immersion the actors experience in the VE is linked to the emotional connection between them and the story narrative; if they feel that the actions they are portraying are reflective of the character, they would be more likely to immerse themselves in the story.

5.3.1.2. Diegetic World. As restated previously, various scholars believe that the same media form and content can have drastically disparate effects across different media users (Lombard & Ditton, 19970; Slater & Wilbur, 1997; Haggis-Burridge, 2020). There are numerous speculations as to why this might be the case, such as personality types (Haggis-Burridge, 2020), though there is no conclusive answer. However, certain steps can be taken to ensure the desired effect is achieved. Lombard and Ditton (1997) attested the sense of presence a user feels in a given mediated experience relies on their willingness to suspend their disbelief and forgo discrepancies that point to the fake nature of the mediated experience. Some individuals who might be familiar with the appropriated technology might struggle in suspending their disbelief as they know how the mediated experience functions on an operational level (Lombard & Ditton, 1997). Haggis-Burridge (2020) argued the opposite, claiming that working with a 2D display, such as the LED wall, the user is “likely to need a higher degree of familiarity with the interface to experience a sense of spatial immersion in the virtual world” (p. 5). This piece of information presents challenges in sampling techniques, as the familiarity with the technology in the volumetric stage could influence the level of immersion actors performing in Virtual Productions experience. Participants similarly noted that.

5.2.2. Real-Time Sound

5.3.2.1. Implementation. Some participants noted that they believe they would have experienced a greater sense of immersion had the diegetic SFX been played throughout the entirety of the Virtual Production shoots. Remarks like these can be explained through a phenomenon Lombard and Ditton (1997) observed in which the consistency of information

received by the medium is important in keeping the actors tethered to the virtual world. Otherwise, the use of individual diegetic SFX can emphasise the areas of the production which do not make use of these, in turn breaking the connection between the virtual and physical world. However, Nazemi and Gromala (2012) remarked that regardless of their perpetual playback, ambient sounds are less likely to communicate important information, thereby hindering the process of immersion in a VE. As similarly suggest, Nelson-Tabor (2021) found that using background sounds during their Virtual Production shoot was distracting:

The only soundmark suggested by the very desolate location was an electric mains hum, attached to a power transformer object in the UE environment (post-apocalyptic setting notwithstanding, artistic license allowed us to suggest that power is coming from somewhere). This sound was also spatially localised relative to a game player's point of view while moving through the scene, but of course VP is a different experience and the transformer was out of shot for most takes; hearing it on set was distracting rather than helpful, so it was removed.

Overall, there seems to be discrepancies amongst the which types of sounds are best suited to enhance actor immersion levels. This is most likely due to the natural differences across individuals, hence resulting in conflicting data.

5.3.2.2. Technical Procedure. Actors found that the playback of the sounds was affected by the quality and position of the speakers. As mentioned in the Limitations, the author of this study was not granted any budget for the Virtual Production shoots used to facilitate the data collection. Therefore, they were only entitled to the equipment present at the LED wall volumetric stage offered by the commissioning company. Regarding the available playback system, it consisted of two stereo speakers two sets of two Martin Audio W3P speakers (2024). Though relevant literature pointed to conflicting data on whether there is a need for 3D spatialisation of the diegetic sound effects (Nazemi & Gromala, 2012) the position of the speakers play an equally important role (Stevens & Raybould, 2016).

Slater and Wilbur (1997) mentioned the effects that the medium has on the perceptual limitations of the user. In order for an individual to feel immersed in the VE, the screen they are interacting with needs to be free from any lags or delays, interferences made by near-by electronics, as well as cables (Slater & Wilbur, 1997). All of these aspects indicate that the media user is, in fact, interacting with some kind of modality, rather than it being an extension of their current reality (Lombard & Ditton, 1997; Slater & Wilbur, 1997). By extension, in order to facilitate immersion, it is required that "actions be carried out in a way

that maximizes the match between proprioception and sensory feedback at the perceptual and cognitive level” (Slater & Wilbur, 1997, p. 605). In the same manner, participants were asked about their perception of the level of synchronisation between the diegetic SFX and the VE. Their experiences of minor lags during the quasi-experimental test-shoot were due to the technical configuration. On the topic, Altman (1992) stated:

Every recording carries the elements of this spatial signature, carried in the audible signs of each hearing’s particularities. Even when those signs are contradictory or have been tampered with, even when they seem not to match the visual data provided with the sound record, they still carry information that is narrative and spatial in nature.

5.2.3. Virtual Production

5.3.3.1. Visibility. As some of the participants mentioned the benefit of possibly having a reference to the VE displayed in front of them. An interview, which Kadner (2019) did with Derry, Founder and Vice President of Visual Effects at Fox VFX Ltd, talked about the issues surrounding immersion when doing performance capture in Virtual Production. (p. 62)

5.3.3.2. Repeated Takes. Separate from the adoption of immersive audio, during the semi-structured interviews, participants noted that repeated takes resulted in their detachment from the VE. Results of the data collection process suggested that the lengthy preparations between shots tire the imaginations of actors and should be addressed accordingly.

5.3.3.3. Virtual Environment. Lombard and Ditton (1997) highlighted the difference between social realism and perceptual realism: Social realism represents the probability which a portrayed event reflects, whereas perceptual realism values the extent to which an event is comparable to reality. Indicating that a virtual environment which portrays an unlikely situation, might be low in social realism, but high in perceptual realism, given that the elements within it closely resemble the expectations of individuals (Lombard & Ditton, 1997). Lombard and Ditton (1997) stated an important aspect when measuring presence through open-ended questions in the correct wording of concepts such as realism. This was especially demonstrated by P3, who noted on one of the questions during their respective interview that, although the simulated environment depicted unearthly creatures, indicating low social realism, they still felt immersed into the diegetic world due to the quality of the computer-generated visuals, which pointed to a higher perceptual realism.

5.3. Conclusion

Additionally, before concluding the interviews, participants were asked whether they were able to accurately recall their performances. The question was an important distinction to make, as Lombard and Ditton (1997) warned about the possibility of conflating these with the shot which didn't implement the diegetic SFX: "mediated experiences that closely mimic nonmediated ones cause difficulties for the reality-monitoring process so that when memories are retrieved, mediated and nonmediated experiences are confused". Nazemi and Gromala (2012) continued this discussion: "It is often difficult to separate the link between our awareness of our internal experience and the physical environment, the external space, because the experience of the physical space exists in the listener's consciousness" (p. 20). The interviews were held on average two weeks following their respective Virtual Production shoots. Although the actors believed that their recounts were shared in full and reflective of their experiences on set, they all insinuated that for the most accurate information the meetings should have been scheduled as early as possible.

6. Conclusion

6.1. Recommendations for Industry

Based on the findings of this study discussed in the Chapter 5, the following recommendations are offered to sound engineers in Virtual Production. Most importantly, the recommendation of whether to use diegetic SFX is heavily dependent on the needs of the director and producer, as well as the set-up of the Virtual Production shoot itself. Additionally, the proposed framework can be implemented solely during shoot rehearsals. By doing so, the recording process is unaffected by the real-time playback, while the actors are still able to draw from a frame of reference that will inform their performance. Kadner (2019) further suggested that actors make use of the previs as a basis for their performance, however, it is unclear whether this is already a standard approach in the industry. This aligns with the flexible and collaborative nature of Virtual Production (Kadner, 2019; Zwerman & Okun, 2024) and is echoed by Carlos et al.:

In a virtual production, filmmakers can use digital graphics tools to pre-visualise and design shots, set up and block out scenes, and even rehearse with actors before actual filming begins. This allows for greater flexibility and control in the production process, as filmmakers can make changes and adjustments to the virtual environment on the fly. (2023, p. 8)

Separate from the adoption of immersive audio, during the semi-structured interviews, participants noted that repeated takes resulted in their detachment from the VE. As they sensed their conscious efforts in acting were eluding them, the actors held a lack of guidance from the director responsible. In response, directors should be more involved in assisting actors to achieve the desired character portrayal. Moreover, producers should manage the amount of time that actors spend on-set when not filming. Results of the data collection process suggested that the lengthy preparations between shots tire the imaginations of actors and should be addressed accordingly. Furthermore, participants noted that they were not able to benefit from the immersive nature of the LED wall-enhanced Virtual Productions since they spent the majority of the time facing away from the screen. To mitigate this issue, studios can place a small screen showcasing the camera feed in front of the actors, or additionally, they can make use of a lower resolution, movable LED panel to display the extension of the VE as it would appear before the actors.

6.2. Recommendations for Future Research

The current study can be interpreted as a first step in the exploration of the effects of diegetic SFX on levels of immersion in actors performing in Virtual Production. However, the results of the study should be treated with caution due to the issues concerning the research design, such as small sample size and individualistic results from the participant interviews. Therefore, future research could benefit from mitigating such issues to produce more concrete findings and extrapolating new data. Additionally, there are certain topics that arose during the course of this research that were unable to be explored further.

The biggest improvement can be made regarding the methodological design of this research paper. One of the main inspirations for the assumed phenomenological paradigm was Bennett (2020), who conducted several cycles of practice using an action research approach (Kemmis & McTaggart, 1988). This method granted the researcher the possibility to adapt their approach after each round of testing, improving the technical set-up as their experimental productions went on. Combinative research of the aforementioned approach and the proposed model should be conducted for a best attempt at determining the most appropriate system configuration for implementing diegetic SFX during Virtual Productions.

Bell et al. (2019) argued that through the eyes of the research paradigm, qualitative and quantitative approaches are incommensurable and therefore cannot be implored to answer the same research question. However, there is an argument that can be made about the efficacy of mixed-methods research and its ability to produce high fidelity results. Through the use of triangulation, which is only possible in mixed-method approaches, the researcher is able to further support any claims made. However, for it to be meaningful, it needs to be strategically and tactfully employed; it is not enough of an argument of *more is better*. “Triangulation refers to the use of different data collection techniques within one study in order to ensure that the data are telling you what you think they are telling you” (Saunders et al., 2007, p. 139). As such, the author is of the opinion that this paper could have benefited from a mixed-methods approach due to the unstable validity and non-generalisable results from the IPA method.

Recommendations for future research are suggested into whether this enhanced immersion affects overall performance quality. Based on the findings of this study, actors felt more immersed, in the virtual environment, as well as in the portrayal of their character, so much so that they felt like they *were* the character or an extension of the character. Slater and Wilbur (1997) stated “participants who are highly present should experience the VE as the more engaging reality than the surrounding physical world and consider the environment specified by the displays as places visited rather than as images seen” (p. 606). Furthermore, as the actors are immersed in the VE, they have a greater chance of behaving in a way that is similar to the real-world experience. In that regard, it can be argued that their portrayal would be more authentic due to the aurally enhanced performance, and therefore of

higher quality. A comparative qualitative analysis should be conducted into whether these speculations are representative of the truth.

In terms of the technical set-up of the quasi-experimental productions, the author suggests that further exploration can be made in achieving the diegetic SFX playback through the Unreal Engine (Epic Games, 2024). Certain DAWs are optimised for live performances which presents the unique opportunity for real-time control of SFX. Combined with elements of Unreal Engine, such as the Sequencer, sound events can be synchronised to the movement in the VE and timed so they fall at the exact same moment each shot. This offers actors a reference for timing their performances, as well as an added layer of interaction between them and the VE. Furthermore, in the preliminary stages of the research report, other practices in achieving immersion through sound were explored but quickly abandoned due to their unfeasibility as it relates to the study limitations. Nevertheless, the use of head related transfer function and ambisonics techniques present an interesting consideration on the topic at hand. The study from Martí (2017) set out to explore how these can aide in the incorporation of hyper-realistic spatial audio into VR scenes for an improved immersive experience, though no subsequent information was provided on whether it yielded any effects. However, the use of these technologies would prove difficult in their use for Virtual Production shoots as they would most likely be visible to the camera.

Some studies in the literature review looked at how interactivity plays into immersion levels: “Again, interactivity, in the sense of whether or not the subjects drove the simulated vehicle or merely observed the VE, had a positive association with reported presence” (Slater & Wilbur, 1997, p. 608). Although during film productions, there is often no place for improvisation, placing SFX in the VE that actors can trigger through actions in the real world could improve their immersion. Slater and Wilbur (1997) argued that “[t]he VE should portray a story line, in which the individual can participate and modify” (p. 609). By doing so, they feel their actions have a direct effect on the VE and are more likely to be immersed in it. However, this would present certain technical challenges and would require further research in the attempt to implement a model of this calibre.

Smart AI-driven characters have been employed by the video game industry for decades (Zwerman & Okun 2024). Zwerman & Okun further argued that “this technology is also well-suited to virtual production application” (2024, p. 155). In addition, procedural sound design and cinematic simulation are two features in game engines relying on the generative processes that are already in use by the industry (Stevens & Raybould, 2016; Kadner, 2019). In the same vein, artificially generated sound effects could become a standard approach. As AI is on the rise, several studies have been done to measure its ability to reproduce realistic and authentic sound effects. Further research could be done into how these AI-generated

SFX compete with traditionally made ones to determine whether their effect on actor immersion levels is comparable.

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Appendix A

Interview Schedule: Actor Perception of DSFX During VP

Introduction

Before we begin, I would like to ask for your permission to record this interview. Afterwards, you will also be sent a content release form in which you also state that you agree to this interview being recorded for the purpose of my research report. I will be using some terminology you may or may not be familiar with.

VP Virtual Production: Also known as in-camera visual effects, VP is a filmmaking technique that employs the use of an LED Wall as a backdrop to the set. It uses a game engine to display a virtual environment in real time, combined with traditional filmmaking equipment.

VE Virtual Environment: A simulated environment created by a game engine and can be accessed through different technologies.

DSFX Diegetic Sound Effects: Sound effects that originate from the world of the character. In the case of the shoot, they are native to the virtual world displayed on the LED wall.

A. General

- 1) What is your performance background/acting experience?
- 2) What do you normally do to prepare for a role?
- 3) When acting, what elements do you find important to be present in order to be more engaged with the role?

prompt: physical props, makeup, costumes.

B. VP

- 4) Have you ever been in a virtual production?
- 5) What are your general thoughts/expectations on working in a virtual production?
- 6) How does acting in virtual production differ from a traditional film set/theatre performance?
- 7) How does the preparation for acting in virtual production differ from a traditional film set/theatre performance?
- 8) Do you think your (lack of) experience with VP affected your performance during the shoot?

- 9) Do you think the novelty of the technology helped you become more immersed in the role/the VE?
- 10) What were your thoughts on the relationship between the virtual world and the physical world during your performance?
- 11) Did you find physical props helpful in the production?
- 12) Did you find projected reference of the virtual world helpful?
- 13) At one point did you feel disconnected from the VE after doing repeated takes?
- 14) Did you find anything limited your performance during the production?
- 15) Are there any suggestions you could make to improve your experience of the virtual world?
- 16) Do you think immersing the performer into the virtual world will become common place in the industry?

prompt: through visual stimuli, meaning the LED wall.

- 17) Would you be interested in working in an immersive virtual production again?

C. DSFX IMLEMENTATION

- 18) Do you believe that your briefing before/directing during the shots with the added DSFX was sufficient?
- 19) Do you think that hearing the DSFX before your scenes would/did have a negative impact on your level of immersion?
- 20) Do you think that the dynamic range of the DSFX was believable?
prompt: the difference between the quietest and loudest sound.
- 21) Did the use of added DSFX affect your acting performance in the takes after those?
- 22) Did you feel more energized after hearing the DSFX?
prompt: new energy for acting.
- 23) At any point did you feel like you were “there”?
prompt: inside the virtual environment.
- 24) Did the sounds have an opposite effect?
prompt: Distract you/take you away from the virtual environment? Break the illusion of being “there”? Or your acting performance?
- 25) Did you feel like the DSFX added to the realism of the VE?
- 26) Do you believe that the added DSFX were enough to evoke said realism/immersion in the VE?
- 27) Do you think the disconnect between the animation and the DSFX playback affected your mediated experience?

28) How did the accuracy of the synchronisation of the DSFX playback and animation affect your performance?

29) Do you think immersing the performer into the virtual world will become common place in the industry?

prompt: through audio stimuli, meaning the DSFX.

30) Do you think the time between having this interview and the shoot affected your ability to recall accurate memories of your experience?

Appendix B

Interview Transcripts

Appendix B1—Interview Transcript № 1

Interviewee: Participant 1

Interviewer: Viktoriya Atanasova

Date of Interview: 08.02.2024

Location of Interview: Online (Microsoft Teams)

Duration of Interview: 00:43:56:07

Date of Transcription: 16.04.2024

List of Acronyms: VA = Viktoriya Atanasova, P1 = Participant 1

Note: This transcript was written full verbatim, including pauses, false starts, repetitions, grammatical errors, and non-verbal communication. Altered sections, for the purpose of preserving respondent anonymity, are marked in yellow. Additionally, any unintelligible or inaudible parts of the recording are marked so and highlighted in yellow. Due to a technical error, this transcript is a combination of two separate recordings, the beginnings and endings of which are also noted. Per the application of IPA in this study, the left- and right-hand margins were used for notating emerging themes in the transcripts. As a result, important insights may be marked in blue. The full recording of the interview can be found at the following link: https://edubuas-my.sharepoint.com/:u:/g/personal/191756_buas_nl/EXM_-fMSJXNOnKtEm4zyva8BclaOCqvMTDCTWYmwridTMA

Start of Recording 1 [00:00:00:00]

P1: [00:00:01:13] I feel nervous.

VA: [00:00:03:08] Nothing to be nervous about! This is all about you and your experience; I'm not gonna be asking you something that you won't know the-the answer to.

P1: [00:00:14:07 – unintelligible]

VA: [00:00:17:15] Um, so i-i-if you're ready we can just start.

P1: [00:00:24:07] [pause] Mhm.

Notes

Coldly answering questions

Only one word/sound

Initial reluctance to share information

Needs more time to relax in the interview

VA: [00:00:25:08] Um, so, before we begin, I want to ask for your permission to record this interview? [pause] And you can just say that now [laughing].

P1: [00:00:39:10] You have my permission.

V1: [00:00:41:00] Thank you. Uh, afterwards I'll also send you, um, a content release form, um, in which it states again that you, uh, let me use the interview for the purpose of my research report. Uh, but I'll send that over—

P1: [00:00:53:07] Mhm.

V1: [00:00:53:07] —once we have the, um, interview done. [pause] Um, so like you said you're in that—

P1: [00:00:59:03] Mhm.

VA: [00:00:59:03] —headspace now, so, I-I want you to keep to it and try to think back to the days that you were on set and, um, filming your scenes. Um, I'm also—

P1: [00:01:11:01] Mhm.

VA: [00:01:11:01] —going to be using some terminology but I think you're mostly familiar with it, like Virtual Production, Virtual Environments, and the last one I'm not sure [??]—

P1: [00:01:21:03] Mhm!

VA: [00:01:22:08] —uh, diegetic sound effects, which is the main topic of my research report. And it basically means any and all sound effects that originate from the world of the character. So in our case that would be, uh, sounds that are native to the virtual world. [pause] So the building, uh, like the-the buildings if there's any like, um, noises from that or there was any cars [pause] um, or the wind—

Notes

Took several minutes to address issue

Certain inability or insecurity

Laughing when feeling uncomfortable or awkward, especially when situation is dependent on their input

P1: [00:01:52:14] Mhm.

VA: [00:01:52:14] Stuff like that. [pause] Um, so I just want to start with some general questions about you, um, and I'll start with— If you can explain what your performance background is or acting experience.

P1: [00:02:15:07] [pause] Ok, of course. [pause] If I could just **pause [??]** this for a second cause I'm watching my phone battery actually, might need to grab first a charger.

VA: [00:02:24:09] Yeah, no worries, um—

P1: [00:02:26:04] Just, uh, cause I think it might **[unintelligible – 00:02:28:02]** [pause] Two seconds!

VA: [00:02:33:07] No worries, I'm here, I'll wait for you [laughing].

[BREAK]

P1: [00:03:11:08] Okay, I'm back now.

VA: [00:03:13:07] Perfect. [pause] Um, I'll just [pause] start over. [pause] One moment. **[unintelligible – 00:03:28:04]** [pause] **[unintelligible – 00:03:39:00]**

P1: [00:03:44:01] Weirdly I have been hearing like you're in a tunnel.

VA: [00:03:47:07] Um, really?

P1: [00:03:51:04] Mhm. It's like your voice a little bit doubles up.

VA: [00:03:54:09] Oh, I think I know what that is. Um. It's because I'm recording this interview, so I think you're also hearing the recording. Um.

P1: [00:04:06:03] Okay.

VA: [00:04:07:09] One sec.

[00:04:10:06] (system sound)

[00:04:14:04] (system sound)

VA: [00:04:15:06] Can you still hear me right now?

[00:04:21:02] (system sound)

P1: [00:04:21:05] And now you are muted.

VA: [00:04:23:03] Yeah, nah. I was trying-I was trying to see something. Um. Is it too distracting because, um, unfortunately I do- I do need the-the other audio? But maybe we can try a different platform.

P1: [00:04:40:09] It is pretty difficult to understand the longer sentences [laughing].

VA: [00:04:45:02] Okay, one sec.

P1: [00:04:46:07] You know what we can do, if you want, if it's easier? Is for— I take your email address, I can call you now on Teams.

VA: [00:04:54:06] Okay.

P1: [00:04:55:07] And in there you can actually record and manuscript straightaway the interview as well.

VA: [00:05:01:08] Perfect. Yes. Let's do that then [laughing].

P1: [00:05:06:00] Yeah.

VA: [00:05:06:09] Okay.

P1: [00:05:08:03] So if you just, uh, send me on the chat your email address and then I'm gonna, uh, straightaway call you back—

End of Recording 1 [00:05:13:06]

Start of Recording 2 [00:05:13:06]

VA: [00:05:16:01] Um. I will, pull up my little, questionnaire.

P1: [00:05:21:02] Mhm.

VA: [00:05:21:09] Um. Yeah, let's just start over. Um, on my first question is: What is your performance background?

P1: [00:05:30:03] So I have studied theatre and professional practice for over three years at Coventry University in England. And afterwards I have worked in different theatre and film productions, uh, different festivals and things like that, for another 3 to 4 years. [pause] So variety of different projects, [pause] modellings and all that.

VA: [00:05:59:01] Yeah. [pause] Um, perfect. Um. How would you normally prepare for a role?

P1: [00:06:08:09] Uh. **First of all, do a read through the script.** (pause) Then, if it's possible, do some rehearsals with other actors involved in the scene. (pause) If not, doing my own performances, **understanding the script and what we are trying to achieve with the scene and with the words that we are using.** And pretty much it.

VA: [00:06:35:06] Um, when you said, "understanding what we're trying to achieve", who would you normally talk to about that? Or would it be just an internal conversation with yourself?

P1: [00:06:46:09] Um. [pause] **Majority of the time it would be more internal conversation.** Especially if it is filming and stuff. You don't necessarily get, uh, a lot of chances to come together as a group beforehand and, you know, have discussions and things. In theatre productions, or in other live productions., you do have this opportunity to do, you know, script reading together and, you know, go more into depth of the scripts and of the storyline. But otherwise, yes, it is totally (pause) **your own understanding, of a script, and your own interpretation,** unless, further guidance is given by the directors, of a project.

Themes

Preparing for the role

Internal conversations

Conversation with the text

VA: [00:07:30:04] Right. So either with yourself or the director, but—

P1: [00:07:34:05] Mhm!

VA: [00:07:34:05] —um, less likely.

P1: [00:07:36:04] Yes.

VA: [00:07:37:09] Um. [pause] When, uh, when you're acting, what sort of elements, um, think physical props, makeup, costume, what elements do you find important, uh, to be present, for you to, uh, engage more with the role, for you to feel, like you are the person that you're, acting as?

P1: [00:08:01:02] I would say, the more props and items and set, you have, the better it is, because it creates more of a reality scene and version. So like you mentioned already, uh, costume, uh, you know, other prop items, tables, chairs or whatever else is needed. And of course, sound is very important because it creates more of a reality feeling.

VA: [00:08:31:03] Um, in other productions that you've worked on, not the [name of project utilised to facilitate data collection], um what kind of role has sound played, um, to, feel like you're actually, um there?

P1: [00:08:45:03] I would say in— it is you see these two differences. In theatre productions, it is extremely important. It plays a major role in a performance as a whole, as well, you know, it in the setting the scene. [pause] So in theatre, stage kind of you are used to it to be s—, you know, surrounded by sounds, which helps you know, to feel the environment more. But in filming, unfortunately, due to the all [??] sounding recordings and all these little, you know, technical bits, very often, you need just to improvise by yourself, and create that environment it in your own head. So even let's say if you're in a scene filming that you're in a bar dancing, [pause] you would not get the music.

VA: [00:09:33:04] Yeah.

P1: [00:09:34:00] You would be dancing to, nothing. So of course it requires, more, uh, [pause] more work in a sense, fr-from an actor to make it real, for viewers to see it and feel it.

VA: [00:09:50:05] Um. [pause] How, i-in comparison to theatre, when—

P1: [00:09:55:26] Mhm.

VA: [00:09:55:26] —you're doing a film, how, much more tiring would it be, to have to, sort of, pretend or have that, like you said, music, in your head?

P1: [00:10:06:95] Mhm.

VA: [00:10:06:95] At the end of the day, do you feel like you— there is a difference?

P1: [00:10:11:89] Yes, I think, uh, [pause] the major thing, the difference between it, would be [clicks with mouth] when you're in the filming scenario, it's to make it, real in your own head. [pause] Because if you cannot convince *yourself* [emphasis retained] that this is you see what you're *hearing* [emphasis retained], what you're *seeing* [emphasis retained], that you are in this environment, you will not be able to, make viewers believe you.

VA: [00:10:39:62] Yeah.

P1: [00:10:39:98] So I think again, it's more an internal work, to truly believe, what you are supposed to see or hear, to make it in your vision.

VA: [00:10:50:01] So a lot of it is, [pause] co—boils down to, *you* [emphasis retained] and your own, um, *will* [emphasis retained] to, pretend that you are there.

P1: [00:11:00:35] Exactly. Exactly.

VA: [00:11:03:73] Good, good, good. [pause] Um. That was more for my general questions. I'm going to transition now, into, um, actually the-the time that we spent working together in [name of project utilised to facilitate data collection].

P1: [00:11:15:25] Mhm.

VA: [00:11:16:24] Um. So I—we briefly talked about this in person. But, um, I wanna ask you again if you've ever been, in a, virtual production before?

P1: [00:11:25:82] No, that was my first time.

Themes

Internal conversations

Building the diegetic world in your head

Better performance

Fake it till you make it

VA: [00:11:27:92] Yes. [pause] I thought so. Um, what are your general thoughts after, working, on a, production like that?

P1: [00:11:37:76] Uh. I think it is really cool. [pause] I can see definitely, why industry would appreciate having, such a setting, and technology around. Because, you know, working, uh, in front of a green screen, let's say—

VA: [00:11:55:42] Yeah.

P1: [00:11:55:42] —it's again, totally different experience, where here, you still get the pluses of at least *seeing* [emphasis retained] the scene, and seeing the environment that you're supposed to be in. So I think it definitely helps. Not only for the actor to feel better, uh, but for directors or like photogra—director of photography, you know, and other people to actually understand it better, the whole environment and what's the best shot, what's the best looks within the character and the set.

VA: [00:12:27:25] Exactly. You-you have a frame of reference to act to, unlike, like you said—

P1: [00:12:32:19] Mhm.

VA: [00:12:32:19] —the green screen.

P1: [00:12:33:92] Exactly.

VA: [00:12:34:35] Um. [pause] How would you compare it to, any other production that you've worked on, if there are any similarities at all? [pause] So, for example, like in theater, I'm assuming, um, it was nice that you also kind of had, like this background, uh—

P1: [00:12:51:06] Mhm.

VA: [00:12:51:55] —for props there.

P1: [00:12:53:56] Mhm. I think virtual production, uh, brings it, the whole filming experience, much closer, to a traditional—

VA: [00:13:04:61] Yeah.

P1: [00:13:04:61] —acting experiences. [pause] I think it's like a little link, connection, bringing the two worlds little bit closer [pause] Because, of course, you are in totally, you know, you are in a box, like, in a XR studio.

VA: [00:13:20:02] Yeah.

P1: [00:13:20:02] So to bring that feel of a scene and environment that you're supposed to be in, I think it, uh, definitely helps. I think that's a good step forward.

VA: [00:13:31:09] Yeah, for sure. A lot of, um, technological advancements as well. Um. How does prepara-preparation for acting in a virtual production differ from a preparation you've done in other works?

P1: [00:13:49:97] Um. [pause] As it was my first time, [pause] to be honest, I wasn't sure even what to expect, 100%. I have seen the previous virtual production, uh, and similar workshops like this, results-end results. But I wasn't still 100% sure how it would feel to be—

VA: [00:14:13:97] Yeah.

P1: [00:14:13:97] —in that s-place, in that stage. [pause] So the preparation work [pause] about the script was primily simil-pretty similar. You know, again, just learning the lines, trying to understand them, and things like that. But, uh, coming into the stage, [pause] I guess it took little bit longer comparing, to warm up to the environment, and to understand that, then, you know, to place yourself correctly in it.

VA: [00:14:47:55] Um, can you elaborate a bit more on what you mean by that? [pause] Was it scary being, uh, um, around so much new technology? Or, was it just because, um, the, filming process is so different, so you had to also, um behave a little bit differently on set?

P1: [00:15:09:68] I think it just, you know, itself, the whole awareness—

VA: [00:15:13:79] Okay.

Themes

Experience with the technology

Acting in the VP space

Understanding its limits

After that it becomes a background process

P1: [00:15:13:79] I would say *that* [emphasis retained] **is what's, you know, more heighten up.** [pause] The awareness of your environment. You know, **understanding the background behind you, understanding, you know, the limits, how far you can go to the left, how far you can go to-to, you know, to the right.** Because as well, at the same time, you have sound team around, so as well, that kind of makes you more aware or in a sense a little bit *limits* [emphasis retained] you how far you can move, you know, what kind of movements you're allowed in a sense to make that it would not distract other technology part, involved in your performance.

VA: [00:15:53:93] [pause] Um. Did you, find that by the end of the, [pause] I-I would guess there, four days that we were filming, that you were more used to it, or were you still, figuring it out?

P1: [00:16:07:99] Oh no, definitely. Of course. I think the first day is the one which is like, you know, hit and—

VA: [00:16:12:41] Yeah.

P1: [00:16:12:41] —miss, kind of, first pancake, that, uh, you know— You're trying all the things out. The technology team is trying all the things out. It just kind of [pause] moulding all together, to make the best result. But I think after the first day you, like even the first half day, **you get used to the environment, you are fully aware of it. And then, it just, in a sense, regular working process as normal would be.**

VA: [00:16:40:42] Okay.

P1: [00:16:40:42] I believe it just, you know, the first like half a day or first few hours coming into the space and *familiarising* [emphasis retained] yourself within the space, within the technology that you are surrounded, and then yeah.

VA: [00:16:53:87] [pause] Wonderful. Um. And [pause] do you think that, your [pause] I would say lack of experience working with VP affected your performance, in any way, during the shoot? Like you said, you had to navigate the—

P1: [00:17:10:42] Mhm!

VA: [00:17:10:42] —**virtual [??]** environment a little bit, see how far you can push the limits, but, anything else that you might have noticed? [pause] In terms of your performance?

P1: [00:17:19:49] Mhm. [pause] Uh. [pause] Good question. I would say [laughing] [pause] I guess, yes, **at the beginning it is little bit more distracting** [pause]

VA: [00:17:34:44] Yes.

P1: [00:17:36:02] to truly focus, you know, all on your acting and on the lines you're saying. Then you have all these little things, you know, happening around you. So I would say, yes. It took me some time to-to-to get used to it. It was, not as straightforward, let's put it that way.

VA: [00:17:57:06] Um. [pause] And do you think, the-the feeling that it was, like, everything was a bit distracting because there was so much to think about—

P1: [00:18:06:27] Mhm.

VA: [00:18:06:60] Did that, um, subside eventually? Were you able to [pause] like, move, embrace it easier?

P1: [00:18:14:10] Yes. [pause] I would say yes, yeah.

VA: [00:18:16:72] Okay. [pause] Um. [pause] What were your thoughts, on the, relationship between the virtual world on the screen, and the vir-physical world during your performance? I-Let's say, at first you were a bit distracted with everything, and afterwards?

P1: [00:18:37:38] I think afterwards. Beca— Okay. Starting from beginning, why it was a little bit distracting in a sense as well, because, obviously when I'm in the scene, I can't see behind me.

VA: [00:18:51:90] Right.

P1: [00:18:51:90] So I can't see the world that I'm supposed to be in.

VA: [00:18:55:66] Okay.

P1: [00:18:56:23] Okay, I can see, you know, what's in front of me, all the cameras and all the technology, but I can't see the screen itself. So I have only these props to help me out to get the feeling, in a sense. [pause] But at the same time, because the, you know the [pause] mini TV screen, camera—

VA: [00:19:13:63] Yeah.

P1: [00:19:13:63] —screen, where the, uh, directors was watching on the side. [pause] Time to time, *in* [emphasis retained] between the filmings, **I would be having a look while I'm on the set** [pause] and *that* [emphasis retained] **would actually help me** [smiling].

VA: [00:19:26:39] Really?

P1: [00:19:27:52] Yes! Because, you know

you don't see behind you what it is, so all these—

VA: [00:19:31:74] Yeah, of course.

P1: [00:19:31:74] —things like, black space and this bench and that's it. But actually then I looked at the TV. I'm like, okay, **this is actually looks real**, like **I'm actually in that, you know, world and that scene**. [pause] And it did help me! The-**It did help me to, believe it.**

VA: [00:19:50:09] Um, and do you think if you had, um, uh, like, had those little moments where you could look at the screen, look at the, like, the screen of the director and also the-the wall behind you, um, [pause] if you had more of that, that it would have been even more believable for you?

P1: [00:20:10:03] [pause] Yes! [pause] I think, you know, in a sense, I know that's probably going totally against, you know, the professional side of it. But I think, in a sense, if we would have done, let's say, few shots at the beginning, right, right at the beginning, and then had the little view over—

VA: [00:20:27:79] Mhm.

P1: [00:20:27:98] —with an actors, involved. Just, you know, a few clips just to see actually. I think—

VA: [00:20:34:37] Where you stand in the virtual environment, meaning?

Themes

No visibility of the LED wall

Reliance on physical props

Looking at camera feed for a taste of the scene

Looks real = feels real

P1: [00:20:37:97] Yeah, yeah, yeah! Like to film something quickly, and then just watch it over. Just to have a look, you know, what's the result and how it's working. I think that would have helped, to get into the environment faster.

VA: [00:20:51:44] Okay. [unintelligible – 00:20:54:13]—

P1: [00:20:54:13] Because at the beginning, you're-you are not 100% you-yourself sure. So you are experimenting, you're trying different things [pause] without necessarily too much direction in the sense, if it's working or no.

VA: [00:21:08:29] Yeah. [pause] Um. [pause] [clicks with mouth] Yeah, that's-that's totally understandable. Or maybe if you had a reference in front of you—

P1: [00:21:17:80] Mhm!

VA: [00:21:17:80] —as well.

P1: [00:21:20:26] Hm, yeah.

VA: [00:21:21:39] A-At one point, did you feel disconnected, from the virtual environment after doing, repeated takes?

P1: [00:21:30:96] [pause] Yes [relieved].

VA: [00:21:31:95] Yeah [laughing]?

P1: [00:21:32:90] Yes. [pause] I think, you know, there is a limit, of how many same shots you can, do without a stop, before it starts feeling, ridiculous in a sense.

VA: [00:21:46:89] Okay. Yeah.

P1: [00:21:47:95] It's like, you know, if you keep repeating the same one sentence over 30, 40, 50 times, without no break in between, like, [pause] y-y-you don't have any more control of your own words, in a sense, i-i-i-it does become— Hm. You-you need to break it. It-it's, not working that way.

VA: [00:22:07:69] Right. So, more breaks in between, uh, would have helped you to have, a-a moment where you could re-generate almost and, go into it again?

P1: [00:22:19:76] I think so. You know, it's like bringing focus back together. Because I do think I had few, like two, I think, incidences, or three maybe, throughout these four days. That at one point, just, halfway through filming, I would start, like, laughing.

VA: [00:22:35:61] [laughing]

P1: [00:22:37:42] Because it's like— You-you can't control it in a sense. I think, you know, like [pause] in, even filming productions that I participated before, [pause] it's not, uh, in my experience, it's not a normal practice to, do so many shots.

VA: [00:22:57:39] Yeah.

P1: [00:22:58:48] So many retakes of the same scene, [pause] just constantly. [pause] So I think what I [emphasis retained] have experienced before, yes, you do film it, you know, a few times, [pause] but not so many. And—

VA: [00:23:12:92 — unintelligible]

P1: [00:23:12:92] —then, you would still take some kind of break. [pause] Because you need to understand what we're trying to achieve here by doing so many takes, like, are we trying to change the performance? I was trying to change lighting? Are we trying to catch different sounds, you know, different angle? Like, I think, uh, that needs to be communicated, because if you keep doing the same for like, 40 times and you still not sure why we keep doing it, it, uh, it kind of loses your, uh, motivation,—

VA: [00:23:43:82] Yeah.

P1: [00:23:43:82] —and understanding what you're actually doing here.

VA: [00:23:46:94] So a more clear communication for-for every take because otherwise, for you it feels like, um, you are, just doing the same thing over and over, and *that's* [emphasis retained] where the disconnect happens.

P1: [00:23:59:53] Yes. Because like, if you're taking so many take, that means you want to change something, or let's say, try out different things.

VA: [00:24:06:34] Yeah.

P1: [00:24:06:73] But I think, uh— [pause] Yeah, it is better if you know what it is that you're trying to achieve .

VA: [00:24:13:04] Yeah! I-I-I understand. Otherwise, um, you don't know what you, you as an actor need to change about your—

P1: [00:24:20:49] Exactly.

VA: [00:24:20:49] —performance.

P1: [00:24:21:24] If it's good what we're doing. Are we totally going different, you know, direction. Yes. I think communication would—

VA: [00:24:29:28] Yeah!

P1: [00:24:29:28] —have helped.

VA: [00:24:30:32] It allows you to, look at the-the scene, let's say, and then, try something else.

P1: [00:24:36:14] Mhm.

VA: [00:24:36:14] And you're conscious and active—

P1: [00:24:38:08] Exactly!

VA: [00:24:38:08] —in **that [??]**.

P1: [00:24:39:40] Exactly.

VA: [00:24:40:88] Perfect. [pause] Um. [pause] Do you find that anything *limited* [emphasis retained] your performance, uh, during the production? [pause] Um, and n-not regarding anything that we've already talked about, like, let's say the-the-the repetition—

P1: [00:24:58:98] Mhm.

VA: [00:24:58:98] —um, anything, other than that?

P1: [00:25:03:52] [pause] Hm. [pause] Hm. [pause] I don't think so. Okay, maybe the only thing, which is not necessarily re-related [laughing] to this project itself, it's like, I haven't-I haven't been *actively* [emphasis retained] performing for f-quite few years. So—

VA: **[00:25:23:23 – unintelligible]**

P1: [00:25:23:23] —of course it was coming back [laughing], you know, to it [laughing]. But apart from that, I didn't-I don't think, there was any other *obstacles* or *challenges* [emphasis retained] [pause], in, uh, in the production itself.

VA: [00:25:36:59] Just a bit of warming up to the acting—

P1: [00:25:39:02] Yes, yeah.

VA: [00:25:39:02] —itself.

P1: [00:25:40:26] Coming out of the shelf.

VA: [00:25:41:96] Yeah [laughing]. Um. [pause] Well, we've already, briefly talked about this, but are there any suggestions that you would make to improve your experience of the *virtual* [emphasis retained] world? So you mentioned, let's say, having, um, a frame of reference in front of you or looking at takes in between—

P1: [00:26:01:62] Mhm!

VA: [00:26:02:63] —um, anything else?

P1: [00:26:06:07] [pause] Uh. [pause] I don't know if I'm jumping already to other questions, because I'm not sure what you gonna ask. I wanted—

VA: [00:26:13:75] No worries [??].

P1: [00:26:13:75] —to touch little bit, you know, base about the *sound* [emphasis retained] effects that you were *doing* [emphasis retained].

VA: [00:26:19:36] Yeah.

P1: [00:26:20:04] Is that a good time to mention now?

VA: [00:26:21:69] Uh, you can! We will g-g-go—

P1: [00:26:23:86] We'll go to it.

VA: [00:26:23:86] —back [??]. Uh, that's my next questions right after these. But if you, want to make, uh, a reference to that then you can of course.

P1: [00:26:32:62] Cause it was obviously interesting experience to-to have them. [pause] And I think [pause] that, if we would have done this from beginning— [pause] Obviously, this was, you know, like, uh, like testing out, kind of, experiment—

VA: [00:26:52:10 - unintelligible]

P1: [00:26:52:10] —so obviously, I understand. But if it was, uh, you know, another take that we would do, some kind of workshop, I would say it would be very interesting to do, it right from beginning to have, some sounds. [pause] I think, uh, it could work [pause] in a possible way, to, giving better understanding and feel of the environment. Which would affect [pause] acting experience, performance in a positive way as well.

VA: [00:27:23:07] Okay. [pause] Well, we will get, uh, back—

P1: [00:27:26:11] Yes. Yes.

VA: [00:27:26:11] —to that [laughing].

P1: [00:27:26:65] Yes, yes, yes. That's why I didn't want to go too much into it [laughing].

VA: [00:27:30:90] Um. [pause] Do you think that immersing the performer into the virtual world through, in our case, the, uh, w-, um, LED wall, like the visual stimulus, will that become a commonplace, in the film industry, in your opinion?

P1: [00:27:49:71] [pause] I think yes. [pause] I think definitely yes. Like we can see already examples, like how many different movies are *using* [emphasis retained], you know, virtual production. I think at the moment maybe it's still more about: a) accessibility,—

VA: [00:28:05:42] Yeah.

P1: [00:28:05:42] —because it's still not, the cheapest kind of, [pause] uh, technology, to use. And at the same time, because, yes, it's not very new, but it's still in a sense new in the industry that there is, uh, challenges [pause] for the talents, working with the, studio technology itself. I think *that's* [emphasis retained] why at the moment it's not as so common because there is actually not as many *people* [emphasis retained] who *do* [emphasis retained] have a particular skill set, to work with this, let's say LED screen and all the other things involved. [pause] But if, uh, educational institutions would be, focusing on it more, an *industry* [emphasis retained] would be building, you know, better communication with educational institutions. They would have more talents and therefore there wouldn't be, you know, such a gap in—

VA: [00:28:57:45] Right.

P1: [00:28:57:45] —industry and it would be more, approachable to everybody. So I think in the future, that's definitely, upcoming.

VA: [00:29:05:64] Yeah. [pause] Yeah, well, also the point of [name of project utilised to facilitate data collection], hopefully, that's—

P1: [00:29:09:90] Yeah.

VA: [00:29:09:90] —the-bridges the gap, yeah.

P1: [00:29:12:07] Yeah.

VA: [00:29:13:23] Um, and would you be interested, in working in another, immersive virtual production again?

P1: [00:29:19:51] Oh, yes, yes [smiling]. It's very, interesting experience, uh, and it's amazing, you know, to work with so many, uh, different people, who, have, you know, their own professional interests, and you can see the passion. Yes, I-I-I love the environment itself.

VA: [00:29:38:22] Perfect. [pause] Um, so w-now we're gonna get into the, sound effects, the diegetic sound effects, and implementing them, during filming. [pause] Um, and I want to start off with: do you believe that your briefing before, um, um, or during the shoot, uh, uh, with the added sound effects was sufficient?

P1: [00:30:02:72] [pause] Mmm. [pause] Yes. [pause] I didn't know what to expect, in a sense—

VA: [00:30:10:14] Right.

P1: [00:30:10:70] —and, it was very intriguing. [pause] So, I think yes.

VA: [00:30:18:91] [pause] Okay. [pause] Good. Um. Do you think that, uh, hearing, the-the diegetic sound effects *before* [emphasis retained], [pause] your scene, would have or *did* [emphasis retained] have, um, an impact, on your level of immersion, whether that's positive or negative?

[00:30:37:57] (mouse click)

P1: [00:30:39:15] Yes. [pause] I think after experiencing it [pause] uh, how to say it [clicks with mouth] [pause] I think during performance [pause] it did in a sense *distract* [emphasis retained] me for a second on two from my performance, because [pause] my brain automatically [pause] goes to the listening.

VA: [00:31:02:55] Right.

P1: [00:31:02:77] And you know, and they try to understand, okay, what is this noise? You know, trying to, make a sense of it. And it takes me away out of the *moment* [emphasis retained], of, uh, performing. So I believe, if I, would have *heard* [emphasis retained] [pause] the sounds *beforehand* [emphasis retained], so I would know, let's say, you know, exactly what it is, I don't [??] know a car driving and honking or like, ambulance passing by, or a helicopter noise. So I think [pause] I would know what to expect, but in a sense, [pause] [clicks with mouth] during the filming it was, yeah— [pause] It was a surprise, so. Of course your-your whole body, starts *reacting* [emphasis retained] to it, rather than focusing on actually what you're doing?

VA: [00:31:48:72] Right. [pause] And, you get distracted from, the acting, so, it, wouldn't—

P1: [00:31:54:06] Mhm [??].

VA: [00:31:54:06] —be, let's say, your best take in, *that* [emphasis retained] specific moment.

P1: [00:31:59:84] The first one, no—

VA: [00:32:01:33 - unintelligible]

P1: [00:32:01:33] At least when I'm doing second one, I know what to expect, then yes [laughing].

VA: [00:32:05:62] Okay. Well good to know—

P1: [00:32:07:30] I think you know as well, because, uh, [pause] [clicks with mouth] obviously we were doing so many takes. And it was all so quiet.

VA: [00:32:14:71] Yeah.

P1: [00:32:15:73] So, you know, *having some kind of noise* [emphasis retained] after, I don't know, 2 hours of doing, same thing, [pause] you know, it kind of inbalance it out a little bit.

VA: [00:32:25:87] Okay.

P1: [00:32:25:87] It shakes everything up. So, I think if we would have it, you know, in the production, *from* [emphasis retained] the beginning—

VA: [00:32:31:62] Yeah.

P1: [00:32:32:38] —then you are familiar with it. [pause] And then it kind of becomes part of the environment that you're filming in, and it kind of embraces your performance in it.

VA: [00:32:41:60] *Because* [emphasis retained] you've been, like, *living* [emphasis retained] in it for—

P1: [00:32:44:76] Mhm!

VA: [00:32:44:76] —the entire duration. Okay.

P1: [00:32:46:98] Mhm.

VA: [00:32:49:20] [pause] Um. D-D-Do you think the dynamic range, which is the difference between the *quietest* [emphasis retained] sound and the *loudest* [emphasis retained] sound, *of* [emphasis retained] the sound effects that we implemented, was, believable?

P1: [00:33:04:15] [pause] Yes—

VA: [00:33:04:15] If you can recall that [??].

P1: [00:33:06:99] Yes, I think I prefer the louder ones.

VA: [00:33:09:75] [laughing] [pause] Okay.

P1: [00:33:13:76] I think it's believable. Yes.

VA: [00:33:18:70] [pause] Did you notice, whether the use of the, sound effects affected your acting performance *after* [emphasis retained] those takes? Where there *wasn't* [emphasis retained] any sound effects?

P1: [00:33:35:90] [pause] Hm. [pause] Good question. [pause] Uh. [pause] I would say [pause] maybe not so much. [pause] Because it was going back to the quiet stage, that you been, used to be in this environment.

VA: [00:34:04:04] [pause] Yeah. [pause] So it didn't, um, really impact your performance because you *had* [emphasis retained] already that, reference, from before?

P1: [00:34:22:55] Yes. [pause] I think it did— You know it did and it *could* [emphasis retained] affect [pause] if it's still continuously happening—

VA: [00:34:31:34] And then stopped. Or?

P1: [00:34:33:24] Exactly.

VA: [00:34:34:65] Okay.

[00:34:35:42] (mouse click)

[00:34:36:54] (mouse click)

[00:34:40:36] (mouse click)

VA: [00:34:40:87] [pause] Um. [pause] Did you feel more— So, let's say— [pause] You said that the first take that was—we did with the sound effects, It was really distracting because it was also quiet, and it was kind of, um, shocking to your body almost. But after you had heard it a few times, did you feel more energized, or found a new energy? For your—

P1: [00:35:03:82] Mhm!

VA: [00:35:03:82] —acting, after hearing, the sound effects?

P1: [00:35:07:02] Mhm. [pause] It kind of creates, you know, uh, [pause] **creates a better feel of the environment.**

VA: [00:35:14:33] Right.

P1: [00:35:16:33] [pause] So I think as well, like, you know, like you mentioned before. **If, before the shoot, we would have sit down and say: okay, so in this scene, we gonna use this one, you know, let's listen f-few times, you know, by ourselves, so we can understand,** you know. We know what to expect. We know, you know, what it gonna bring to the scene. [pause] I think then, yes, you know, **it wouldn't be as [emphasis retained] such a unexpected, in a sense, distraction [emphasis retained], because [pause] your brain knows what to expect, and you can just, you know, go with it?** So it wouldn't be, your brain try-ing to figure out, okay, what was the sound? Was it actually a car? Was it actually a bus? Was it a this, you know [laughing]?

VA: [00:35:52:92 - unintelligible]

P1: [00:35:52:92] So I think, uh, yes. [pause] It would-i-i-i-**it does make a positive change [pause] while you doing filming in VP, [pause] having sounds.**

VA: [00:36:02:96] That's what I want to hear [laughing]. Um. [pause] And, at any point, did you feel like, by, hearing the sounds, in that moment, that you were, *in* [emphasis retained] the virtual environment, and truly suspended, all, uh, like-like, almost like a sensation in your body, that you were on that rooftop?

P1: [00:36:25:80] Yes. Yes. **It did bring the, real f-reality feel. It did bring me, you know, it did bring the scene and set *live* [emphasis retained]. The sound does *truly* [emphasis retained] help,** so therefore, I think, like I mentioned before, that it *is* [emphasis retained] a very positive thing to, actually, to involve [pause] into a virtual production. [pause] Well actor, of course everybody, you know, it's indep-individual thinking, and different thinking, but for *me* [emphasis retained] it definitely adds that [pause] nice spiciness, nice touch, to the whole performance [smiling].

VA: [00:36:59:51] Perfect. [pause] Um. [pause] And [pause], um, separate from, um, the shock that you felt, at the beginning, or, um, [pause] the recognition of the sounds, themselves, did you feel like, they were placed, correctly? [pause] Like, did you feel like it was, either disconnecting [pause] at, uh, *from* [emphasis retained] the virtual environment, because where they were placed? [pause] When they were played, at least.

P1: [00:37:29:63] Mhm. Do you mean were the-the plays? Do you mean talking about the *scenes* [emphasis retained] or do you mean physically where the speakers were hanging and where the noise was coming?

VA: [00:37:40:95] Uh, I mean in the scene, but that is an interesting follow up question [laughing].

P1: [00:37:46:38] Uh [pause] in a scene, yes! [emphasis retained]. [pause] Yes. The placing was correct. [pause] I wanted more [pause] more sound after I heard, I wanted more [laughing]. But the placing yes, was correct, and [pause] what else was the question? It's good because I can see all the questions here, so, did you feel it was correctly?

VA: [00:38:11:34] Um, yeah you-a you also mentioned that, um, y-you, you asked about the speakers, was that also, um, the-were they in a position relative to *you* [emphasis retained] at the stage where you could feel like the sounds of were realistic and actually coming from the environment?

P1: [00:38:33:58] Um, I think first take we done it, it was, it was a bit far away in a sense. Therefore I asked, okay, can we do it again but little bit louder? So I could hear it better in a sense. But after the volume was increased, yes [emphasis retained], it did make it more realistic, more understanding, and added a, a reality feel to the, to the scene.

VA: [00:39:13:87] Um. And do you think that immersing the performer in the virtual environment *through* [emphasis retained], um, audio stimul-stimuli, like the sound effects that we *used* [emphasis retained], will also become a commonplace in the industry?

P1: [00:39:31:88] That's a very good question. I would say as an actor, or at least, amateur actor, I would say, it would be amazing, cause it brings so much positive points to actually set, and you know and performance. *But* [emphasis retained] thinking from, from producer side or from the technology side I'm just thinking you know, how much more trickier does it make for technicians to make it all work together, rather than adding the sound in post-production? Cause I think as amazing as it is, I'm not sure if it's too much work, technically, to make it happen—

VA: [00:40:21:88] Right.

P1: [00:40:22:51] —Just to please the actors in a sense.

VA: [00:40:26:40] I understand what you're saying, yeah.

P1: [00:40:28:41] Cause I think, I'm not sure if you know the-the sounds, I don't think, I don't know, how much benefit it brings to other, team members, of VP. I think that's amazing for an actor.

VA: [00:40:43:60] For an actor, yes, I, it would be interesting to see what if-how it would affect the *crew* [emphasis retained] uh, production crew for example—

P1: [00:40:51:41] Yeah.

VA: [00:40:51:43] —But, um, in my opinion because at least for the [name of VP project utilised to facilitate data collection] that we did, um, we, since we were already *not* [emphasis retained] going to use most of the dialogue that we recorded, of *you* [emphasis retained], then, it wouldn't really impact, um, the actual filming process at least, in my opinion—

P1: [00:41:13:71] mm-hmm.

VA: [00:41:14:88] I don't know how, um, you experience that of course, because you were also part of the organ-organization of the project itself.

P1: [00:41:28:29] No, yeah, it's an interesting point.

VA: [00:41:31:30] Yeah. And-*and* [emphasis retained] my final question, um, kind of topical to our interview is, do you think that the time between *having* [emphasis retained] the interview and the shooting affected your ability to recall, um, your memories accurately, your experience?

P1: [00:41:56:26] Uh, I would say yes, because the closer, you do the interview, the more fresher the, the memories are. [pause] It kinda of course, gives you time, to, to bring your thoughts together, to *really* [emphasis retained] you know look back and evaluate, okay, what happened? How did it affect me? You know, you ca-you have time to actually *think* [emphasis retained] about it, but in a sense like, okay now because I was doing the other interviews, so, like you know, processing them, so, it brought me back into the field, but I think, it is easier in a sense to do it *closer* [emphasis retained] post, post the filmings and stuff.

VA: [00:42:49:41] Yeah, exactly. Do you think, um, it would be, it would have a stronger indication if we had done it just after we had used those takes with the sound effects?

P1: [00:43:03:38] *Yes!* [emphasis retained] Yes I think then I would have maybe more, more *fresh* [emphasis retained], how to say, uh, feedback to give, of how I felt. Cause you know with the time still your brain kind of just—

VA: [00:43:22:67] Yeah.

P1: [00:43:23:17] —you know, delete some of the things, leaves the core memory, but you know there is little things, it kind of you know, goes away. So I think if we would have done it right *after* [emphasis retained], maybe I would have some more different points to say.

VA: [00:35:00:94] Right. Yeah, good to know, um, I have to get on it, quicker [laughing]. Um, that was all my questions.

P1: [00:43:48:71] Oh, amazing! I hope the, [unintelligible – 00:43:52:95] I'll stop recording.

VA: [00:43:55:10] Yeah.

End of Recording 2 [00:43:56:44]

Appendix B2—Interview Transcript № 2

Interviewee: Participant 2

Interviewer: Viktoriya Atanasova

Date of Interview: 20.02.2024

Location of Interview: Breda University of Applied Sciences, Breda, The Netherlands

Duration of Interview: 00:25:38:17

Date of Transcription: 30.04.2024

List of Acronyms: VA = Viktoriya Atanasova, P2 = Participant 2

Note: This transcript was written full verbatim, including pauses, false starts, repetitions, grammatical errors, and non-verbal communication. Altered sections, for the purpose of preserving respondent anonymity, are marked in **yellow**. Additionally, any unintelligible or inaudible parts of the recording are marked so and highlighted in **yellow**. Per the application of IPA in this study, the left- and right-hand margins were used for notating emerging themes in the transcripts. As a result, important insights may be marked in **blue**. The full recording of the interview can be found at the following link: https://edubuas-my.sharepoint.com/:u:/g/personal/191756_buas_nl/ESq43wKEtVpLiFECmNsZeZkBxVQJ-ifV_eEX3uouZUleSQ

Start of Recording [00:00:00:00]

VA: [00:00:00:54] Um, can I please have your consent—

P2: [00:00:02:55] Yes.

VA: [00:00:02:55] —to record this?

P2: [00:00:03:02] You have my consent.

VA: [00:00:05:84] [pause] Okay, perfect. [pause] Uh. So, my first [pause] question is, uh— My first three questions will be generally pertaining to, your performance background. [pause] Um. [pause] And then later we will go into VP, and then the, implementation of the diegetic sound effects. Can you please tell me what your performance background or acting experience, is?

P2: [00:00:31:47] [laughing] Let's say non-existent.

VA: [00:00:33:97] Okay.

P2: [00:00:33:97] Um. I'm normally not an actor. I get asked by students, to do stand in, or [pause] stand in front of the, XR stage once in a while.

VA: [00:00:43:05] Right.

P2: [00:00:44:06] But I'm not an actor by trade.

VA: [00:00:46:38] Okay.

P2: [00:00:47:00] [laughing]

VA: [00:00:47:67] Um, and when you *are* [emphasis retained] doing these, favours, do you, have a routine that you, do that you would, prepare for a role?

P2: [00:00:57:05] Um, I normally ask for a script, then I know what is expected of me, and, not just a script that says like, my voice lines, but also like, what do you want me to do, move, wear, look, uh, expressions. Um, I ask the students to be, [pause] to dumb it down, like, that you have to describe it to a kid [pause] and tell me exactly what you want from me. [pause] So, I guess it's not creative acting, but very—

VA: [00:01:23:63] Analytical.

P2: [00:01:24:09] Yeah, very analytical, very thought out, beforehand, but they get what they want.

VA: [00:01:29:39] Um. [pause] So, just, mainly from an educational, perspective, you want them to also do this work so that you know that they're putting in the, amount of effort—

P2: [00:01:40:19] Yup.

VA: [00:01:40:19] —that is required.

P2: [00:01:41:32] Yup.

VA: [00:01:42:20] Um. [pause] And still, when you're acting, what elements like physical props or makeups or costume, do you find important, to be present, in order to be more engaged with the role?

P2: [00:01:54:80] Um, yeah. Um. [pause] The outfits, uh, costumes, are very, for me, like, important. When [??] we did um the [name of older VP project P2 was a part of] shoot, it's

been a while, it's not this shoot, uh, we had someone with, um, a spaceship, outfit. That really helps to tell the story, to also get into the role. Um, but I think the outfits definitely work. They help a lot. [pause] Makeup [pause] doesn't do much for me because, uh, to be fair, I don't see my own face as I act [smiling].

VA: [00:02:26:43] Right.

P2: [00:02:27:03] Um, so, uh, the outfit you can-you can feel and sense. [pause] I don't [??]— The makeup doesn't add, anything for, me becoming more my character. Props definitely. Yeah. [pause] Otherwise, um, what to do with your hands [smiling]. If you can hold something or you can [00:02:42:79 – unintelligible]. [pause] Depending on the script, [pause] uh, it would help a lot for your pose and, [pause] uh, [pause] yeah. [pause] So props and outfits, lets say.

[00:02:53:13] (touchpad click)

VA: [00:02:53:08] Okay. Things that you can f-feel.

P2: [00:02:56:13] Yeah. Physically touch.

VA: [00:02:56:91] Physically touch.

P2: [00:02:57:74] Yeah.

VA: [00:02:58:88] Uh. [pause] I will transition now into my questions about VP. [pause] Um. Wh-How— Have you ever been in a virtual production?

P2: [00:03:08:06] Yes [laughing]. Multiple. [laughing]

VA: [00:03:11:11] Also a-in the role of an actor.

P2: [00:03:13:15] Yes. Yeah, I did a couple of [pause] favours, as you call them. Yeah, I have a couple [??] of 'em. Uh, mostly to test out specific shots or Unreal backgrounds. Um. [pause] But since we're a school [pause], um, it's easy to just use someone from the team. [pause] So I've been a [pause] volunteer before.

VA: [00:03:35:04] All right. Um, what are your, general thoughts on working in a virtual production.

P2: [00:03:41:04] Uh, it really helps a lot. I couldn't do this in a greenscreen room. I don't have the, training or [pause] acting, career to be able to [pause] to do that. So for me as a non-actor, it's really nice to know what to look at. If the, director goes like, I want you to look

at the alien hand in the background or the, uh, whatever is on the background, it helps me to focus, so I look at the correct point. Um. [pause] For the mood [??] [00:04:08:85 – unintelligible]. Like a Christmas shoot is completely different than a sci-fi shoot, um, so that helps also, I guess with expressions. [pause] Uh, yeah, it's nice. [pause] It goes also fast. [pause] The, um, I feel like the shots are done fast. But maybe that's because I'm-I work in education. We don't do over and over and over again. We, um, we have limited time.

VA: [00:04:32:02] Once you have your shot, you move on.

P2: [00:04:34:23] Yeah.

VA: [00:04:34:13] Okay. [pause] Um. [pause]

[00:04:38:03] (touchpad click)

VA: [00:04:39:07] [pause] Have you ever acted in a *traditional* [emphasis retained], uh, film before?

P2: [00:04:43:93] No [chuckling].

VA: [00:04:44:12] Okay. Good to know. Um. [pause] Do you think, um, that your, experience with V P also as a, producer, or as a, supervisor, affects your performance as an actor, during the shoot?

P2: [00:05:03:55] Hm. [pause] Maybe a little, because I know the pipeline,—

VA: [00:05:09:29] Right.

P2: [00:05:09:29] —I know that, once I'm waiting in front of the XR stage there's no point of, getting in pose because you have to wait for the Unreal background to be ready and the lights and— Working with student teams, depending on [pause] how well the student team knows each other, it can take several minutes before they're ready until, like really, like 15 minutes, 20 minutes. Um. So it definitely helps to be familiar with what's going on. Um. S- Some student groups are really fast, so it's like, quite, upbeat tempo when you-you go through it. Um. [pause] But I think, because I've been in several different roles, I also know, that if I do a shoot, I have to plan out a couple of hours. It's not something that you do the 10 minutes and done.

VA: [00:05:55:42] Right.

P2: [00:05:55:84] Yup.

VA: [00:05:56:43] But, do you think that knowing the pipeline, and like you said, some groups would take a bit, slower to set up, the scene, seeing all of that, does it [pause] affect your immersion?

P2: [00:06:11:04] Oh, like that. Um. [pause] It could be, if it takes too long. Yeah, like if you're ready and you know the script and you, you-you know your lines and you wanna-it's go time—

VA: [00:06:21:66] Yeah.

P2: [00:06:21:66] —and then, the-the production team is struggling, It can definitely be like a s-, um, um,— You have to stay in character—

VA: [00:06:30:92] Exactly.

P2: [00:06:30:92] —yeah. Yeah.

VA: [00:06:31:43] It takes you out of—

P2: [00:06:32:30] Yeah.

VA: [00:06:32:68] —the, character and the expe—

P2: [00:06:33:12] Cause you're looking over your shoulder the whole time, like, are we ready? What are we waiting for? What's happening? Yeah. No, that's definitely true.

VA: [00:06:40:55] Um. [pause] Outside of that, knowing the technology, does it also break the illusion? Like, you know that, behind the screen there's not a real environment, so does, does that affect— Compared to, for example, someone that has never worked with this technology and—

P2: [00:07:00:14] Oof. [pause] That is a difficult question. Uh, since I'm also the, often the 3D artist that build the environment—

VA: [00:07:06:99] Right.

P2: [00:07:07:13] —I [pause] do not know what it's like to not know it [smiling].

VA: [00:07:11:10] Okay.

P2: [00:07:12:23] Um. [pause] On the other hand, I know what's next to the screen. So, on the screen we only see a section of the Unreal scene, of the digital world—

VA: [00:07:20:13] Yeah

P2: [00:07:21:50] —I know that, let's say, behind [pause] the-the screen there is more to it, that if the camera is gonna rotate, we're gonna see more of the world. [pause] Maybe if you do not know that [pause], um, if you never seen the world, you do not know what's coming. When the camera rotates it's gonna be like [??], "Oh there's a tree and a wall!", and, [pause] and I'm very aware of what's to expect, because it's—

VA: [00:07:42:02] Right.

P2: [00:07:42:02] —I made it. [pause] Um. [pause] I guess it will be different for immersion, if I have to make an educated guess. Um.

[00:07:54:06] (touchpad click)

P2: [00:07:54:47] [pause] For me, it's very clear, polygons and LEDs.

VA: [00:07:58:11] You can almost see through the trees and see the process that it took you—

P2: [00:08:02:27] Yeah.

VA: [00:08:02:27] —to get there. So it does [pause] s-slightly break the illusion for you, because—

P2: [00:08:07:05] Yeah, but on—.

VA: [00:08:08:23] You've seen it from start to finish.

P2: [00:08:09:07] —but on-on that ac-aspect, all movies and all video games are already broken for me.

VA: [00:08:13:04] Okay.

[00:08:15:06] (touchpad click)

VA: [00:08:17:71] [pause] Um. [pause] Specifically for your performance in the [name of project utilised to facilitate data collection] shoot, what were your thoughts on the relationship between the *virtual* [emphasis retained] world, and the *physical* [emphasis retained] world, [pause] during your performance, [pause] as an actor?

P2: [00:08:35:12] [pause] Um. In that shoot, there wasn't that much of a, physical world. Uh, there was a chair that I was leaning on, but that wasn't in frame. And then there was the other actress, [pause] and I think the other actress was the only, physical, element.

VA: [00:08:50:94] Right

P2: [00:08:51:71] Um. [pause] So it was a clear [pause] distinction between the two. It was not the same world. The-the phys- the digital world was definitely a different world. There was no immersion in, it being the same world, not like we did it in previous shoots.

VA: [00:09:06:82] Yeah. [pause] I mean, the scene just didn't allow for it—

P2: [00:09:11:11] Yeah, that's [00:09:11:54 – unintelligible]—

VA: [00:09:11:11] It's an empty hallway.

P2: [00:09:13:66] Yeah, yeah, yeah.

VA: [00:09:13:66] Exactly.

P2: [00:09:14:01] Yeah, it's-it's not a-it's not per say a bad thing, I wanna say. Cause we did shoots that we did over the top with blending and immersion, and then we did shoots that don't need it because you don't see it right.

VA: [00:09:24:74] Right. [pause] Um, I do wanna, backtrack just a little bit.

P2: [00:09:29:08] Yeah.

VA: [00:09:30:07] Do you think that [pause] the [pause] it doesn't help you, the fact that yo-like—Can you suspend the disbelief for a moment when you're trying to force yourself, fo-quote unquote, force yourself to act? Um, or does it still affect your acting, performance [pause] in a w-subconscious way, almost?

[00:09:56:88] (touchpad click)

VA: [00:09:57:77] [laughing]

P2: [00:09:58:21] You got some questions [??] [laughing].

VA: [00:09:58:87 – unintelligible] [laughing]

P2: [00:09:59:57] Uh. [pause] Yeah, I think I can. I think I have enough imagination—

VA: [00:10:06:00] Right.

P2: [00:10:06:12] —to, imagine being the scientist looking up from my computer, even if it's just a chair, [pause] um, and looking confused at what's going on, beyond the walls. [pause] It's, yeah. Uh. [pause] What I'm also very aware I'm not a professional actor [chuckling], uh, then [??] that maybe doesn't look like that. [00:10:29:51 – unintelligible]

VA: [00:10:29:05] Um, it's interesting that you said that because previous interviewees have also said that a lot of it comes down to, your preparation and how much you can [pause] like, make the illusion in your head, like, build it out further—

P2: [00:10:45:08] Yeah.

VA: [00:10:45:12] Do you find it difficult to do that or like you said, because you have to, you do it?

P2: [00:10:52:00] No, I think it's very easy—

VA: [00:10:53:73] Okay.

P2: [00:10:53:73] It's also— [pause] But that's more for my teacher role again. I see the 3D worlds—

VA: [00:10:59:31] Yeah.

P2: [00:10:59:31] —before we gonna use them for, filming. So I already see the whole world on a computer, fly through with the camera in 3D, see what it's like. So in my imagination, that whole world is already there,—

VA: [00:11:09:13] Okay.

P2: [00:11:09:13] —even if I only see a fraction on the screen.

VA: [00:11:12:00] Yeah.

P2: [00:11:12:73] Um.

VA: [00:11:13:08] So you can imagine yourself being in the, full world and not just a—

P2: [00:11:17:10] Yeah, yeah.

VA: [00:11:17:10] —slice of—.

P2: [00:11:17:12] Yeah. I know that if the camera person would do a 360 with the camera, I can see the whole world. I know what's [pause] around me. So to say.

[00:11:26:99] (touchpad click)

VA: [00:11:28:15] Um. In, again, in the specific [pause], in your specific performance during the [name of project utilised to facilitate data collection] shoot. Did you find anything, limited your performance?

P2: [00:11:39:40] [pause] Um. Well, the chair was definitely uncomfortable [laughing].

VA: [00:11:43:00] [laughing]

P2: [00:11:43:88] Um. [pause] And, since in the original shoot there was a computer there—

VA: [00:11:50:02] Yeah.

P2: [00:11:54:01] —I start with looking down and I had to look up to a specific point, and it definitely took a few takes for me to get the motion right. Also, with the framing of the head, um, in frame. [pause] Um, I kind of guessed when to look up [pause] in the first shot, unless you added the audio, layer, on top of it. That one gave me more of a cue, “Okay, now look up”.

VA: [00:12:12:98] Mhm.

P2: [00:12:13:42] Um. [pause] I can, imagine that if I-if there was more of a physical set, that it would definitely help.

VA: [00:12:24:01] Right. And we'll get to the audio part—

P2: [00:12:26:46] Yeah, okay.

VA: [00:12:26:46] —later, but I wanted to, touch on the chair comment.

P2: [00:12:30:02] Yeah.

VA: [00:12:30:77] Do you think that having [pause] something so, physically distracting, something that you have to lean on or something that's not part of the shoot, but you have to do for the sake of the shot, does that limit your performance?

P2: [00:12:46:12] Yeah. I think that breaks the imagination. If that was a proper desk with a real old computer and emitting light on me or whatever, that might be better for immersion's sake.

VA: [00:12:55:02] Right.

P2: [00:12:55:15] Yeah.

VA: [00:12:56:07] Okay.

P2: [00:12:56:54] I understand it, requires the, director to do-bring all these props in that you might even not see in camera.

VA: [00:13:02:11] Yeah.

P2: [00:13:03:12] So it's a, consideration that has to be made as it was [??], versus the outcome.

VA: [00:13:09:05] And the physical markers, like looking down at the screen, if it had been there, not only would that, help, for, the head movement, but also, would it help for your immersion? [pause] with-in the role or wi-for the scene.

P2: [00:13:24:65] Hm. Not really, that was more about staying in frame and being on cue.

VA: [00:13:29:07] Right. Okay.

P2: [00:13:30:07] That might be even, yeah, just to being on cue part might even be more distracting, [pause] breaking the [pause], um, immersion.

VA: [00:13:37:39] Having to time it.

P2: [00:13:38:10] Yeah.

VA: [00:13:38:61] Because you have to think.

P2: [00:13:40:35] Yeah. I'm more-I am more-I was more busy with the, "Okay, I have to be on time and look up because at one point this, um, [pause] alien would hit his leg against the window—

VA: [00:13:49:60] Right.

P2: [00:13:50:32] —and then [name of co-star in project utilised to facilitate data collection] would turn around”, so there was a lot of, timing things there? [pause] W-which you had to take into account next to the acting.

VA: [00:13:59:11] Exactly. You couldn’t just, act as how you think the actor would, act. You had a lot more, to consider.

P2: [00:14:06:02] Yeah, because we are copying, like [??], an existing shoot.

VA: [00:14:09:00] Okay.

P2: [00:14:09:52] It was not like, reacting to it [??]. We wanted to do it exactly like, the previous shoot.

VA: [00:14:15:09] Had it been [pause], um, not a-an exact replica, and you were free to [pause] act how you wanted, um, how would those physical props helped you, without the destruction, of the timing?

P2: [00:14:34:15] Um, well the physical the chair for example that was for my pose—

VA: [00:14:38:14] Right.

P2: [00:14:38:20] —It was a bit of a weird pose to hang. [unintelligible – 00:14:42:00] There was a bit of an uncomfortable pose, uh, what they went for in the original shoot. I think if you’re not unlimited by the original shoot we could go with a lower desk or higher desk, and maybe the acting became a bit unnatural?

VA: [00:14:55:02] Mhm.

P2: [00:14:54:03] Um, the feeling of, first look up tilt your head a bit back, keep your shoulders

straight and look up at the wall, look back at [name of co-star]

VA: [00:15:02:12] Right.

P2: [00:15:02:20] That whole, timing, rhythm would have gone away by just, *act* [emphasis retained].

VA: [00:15:08:12] Right.

P2: [00:15:09:06] Yeah.

VA: [00:15:11:15] Um, are there any suggestions, again as an actor, *not* [emphasis retained], as a supervisor or lecturer, any suggestions that *you would make* [emphasis retained], to improve your experience of the virtual world, during your performance.

P2: [00:15:26:00] Of the virtual world?

VA: [00:15:28:01] Yes.

P2: [00:15:29:00] Um.

VA: [00:15:29:17] The-your experience at the virtual world. So it could be things in the physical. [pause] We said that, eh, for that specific scene **there is [??]** wasn't many *props* [emphasis retained] that you could've added, just because the scene didn't require it, but like you said the, if you had a desk.

P2: [00:15:51:15] Yeah, **so [??]** now that I'm thinking of it, what, **[name of director of project utilised to facilitate data collection]** the director could have done, is If you have a mirror on the floor, then you could see the wall in the mirror, because I was looking *down* [emphasis retained] so much, and I had no clue what was going on the wall but it was just this very specific shot.

VA: [00:16:08:06] Yeah.

P2: [00:16:08:15] I think with a mirror, just now, thinking about it, brainstorming it, I could have maybe seen the timing of the monster and then be more on cue? Like, um, an extra, element that adds a **[unintelligible – 00:16:22:06]**.

VA: [00:16:23:18] Mhm.

P2: [00:16:24:21] Um, but definitely if the, if there was a more, set building, it would have helped, for sure.

VA: [00:16:33:13] Thank you. Um, do you think immersing the performer into the virtual world through, visual stimuli like the LED wall will become commonplace in the film industry?

P2: [00:16:43:03] Yeah. yeah, it's a, easy answer you see it happening a lot, now, this week there, **[??] AI** got released. Yeah, I'm not sure if you've seen that one that does, eh, text to video?

VA: [00:16:56:13] Um, I-d I have seen a few examples—

P2: [00:16:58:92] Yeah, yeah.

VA: [00:16:59:13] —of that.

P2: [00:16:59:20] There's a new one now and it is *super* [emphasis retained] good results and if you put that on an XR stage, you can make backdrops, like, on the stage itself, you can just type what you want—

VA: [00:17:09:06] Yeah.

P2: [00:17:09:11] —and it will be on the stage—

VA: [00:17:10:13] In real time.

P2: [00:17:10:15] —and I think that will be *super* [emphasis retained], super fast. Um, so yeah it is definitely the future the combination of VP walls, LED walls, in combination with, like an AI for example, that will be crazy.

VA: [00:17:24:00] Um, thank you interesting comments, and, would you be interested in working in an immersive virtual production again?

P2: [00:17:30:20] Yes.

VA: [00:17:32:09] You kinda don't have an option.

P2: [00:17:33:14] [laughing] [unintelligible - 00:17:34:14]

VA: [00:17:34:20] Um, I will now move on, um, to the part of the, questionnaire that, um, involves the, implementation of my diegetic sound effects.

P2: [00:17:44:18] Mhm.

VA: [00:17:45:05] Um, do you believe that your briefing, before, um, or dur-during the shots, uh with the added sound effects was sufficient?

P2: [00:17:57:11] Um, now I have to, remember that. [pause] I think so I didn't have any questions of belief.

VA: [00:18:07:02] Okay.

P2: [00:18:07:09] Um, I don't think there wasn't even a lot of briefing, because I feel like you also just wanted to play and see how we react to it? There wasn't a really like, okay when you hear *this* [emphasis retained] sound effect, I want you to do that, whatever. Uh, so, for me it was clear, uh, what I remember from it nothing stands out, that it wasn't clear.

VA: [00:18:26:15] Um, I guess it also is affected by the fact that you've been at every step—

P2: [00:18:31:15] Yeah, yeah.

VA: [00:18:31:16] —through, the project—

P2: [00:18:32:08] You're.

VA: [00:18:32:20] —Exactly

P2: [00:18:33:15] Yeah.

VA: [00:18:33:21] But, the, main goal was [emphasis retained] to see whether the, distinction would arise naturally within the, performer—

P2: [00:18:41:19] Mhm.

VA: [00:18:42:07] —without, any, sort of directing so I would tell you *now* [emphasis retained] react to this,—

P2: [00:18:47:19] Yeah.

VA: [00:18:48:10] —this way. Okay, you understand that. Um, do you think that hearing the diegetic sound effects before your scene, would, have or did have an impact, on your level, of immersion?

P2: [00:19:01:00] Before recording?

VA: [00:19:02:11] Before recording.

P2: [00:19:04:00] Um. [pause] Y-yeah, I think, it might ruin it, especially because we're going for this big, dark, sci fi, horror shot, the, the low growl [??] called like that I'm not sure what you call the sound effect. Um, definitely added the *mood* [emphasis retained] in there, and if you want actors to, really look surprised or give you a what's going on expression, it might be more true if they didn't hear it before. Um, it also kind-se, of kind of des-, depends on the setting and maybe also about the skill of the actor, but if you-f want true surprise or true, confusion, I think that would be really nice, to not know what's coming.

VA: [00:19:50:11] But you do also think that it mostly depends on the type of, shots—

P2: [00:19:54:18] Yeah.

VA: [00:19:54:20] —like, you said, this one would be more scary, so ha-having that novelty, would cause a more natural reaction.

P2: [00:20:01:12] Yeah. Yeah and if you for example, have a shot where you want the actor to look confused, and you play a random beeping sound and, he looks into the camera like what's, is this part of the shoot or not?

VA: [00:20:13:06] Right.

P2: [00:20:14:03] Um, if you know it's gonna happen, maybe you get the, a worst shot. Or you have a really good actor and he does it over and over exactly the same, yeah.

VA: [00:20:25:11] Um, [pause] Do you think that the dynamic range, meaning the difference between the quietest and the loudest sound of the die-diegetic sound effects was believable? Like, um, that's how, uh, pen falling on the floor compared to a low growl would sound naturally if it had happened.

P2: [00:20:49:03] Yeah, I think the, the sound effect was right, yeah. It sounded like it was behind the glass, on this-the distance that I was yeah.

VA: [00:20:59:10] Um, [pause] [??] I will, adapt this question because it doesn't really work for this. Do you think, that, there was a difference in your performance, um, in the takes *with* [emphasis retained] the diegetic sound effects and, without the diegetic sound effects?

P2: [00:21:22:00] I think so yeah. I think the, *with* [emphasis retained] shots, helped my timing, since I was looking down I couldn't see the wall.

VA: [00:21:27:11] Right.

P2: [00:21:28:08] The, director said, um, go, um, I had to look up at a point, I think the audio definitely helped with timing it, cause I knew when to expect the, tunk-tunk.

VA: [00:21:41:13] Um, at any point did you feel that the diegetic sound effects, um, make you feel like you were *there* [emphasis retained]? Meaning in the virtual environment?

P2: [00:21:52:14] Uh [pause], no? [unintelligible – 00:21:59:19] That's already to my previous—

VA: [00:22:02:06] Right, we

P2: [00:22:02:12] —[unintelligible – 00:22:02:15] I don't feel fully immersed like it's a VR game, for example.

VA: [00:22:07:04] Exactly.

P2: [00:22:08:07] But um, it does help, maybe to know what the monster would sound like.

VA: [00:22:13:08] There are a lot of moving parts and, just from the VP, perspective of it, that, already breaks the illusion for you.

P2: [00:22:21:02] Yeah.

VA: [00:22:24:11] Um, in any of the takes with the diegetic sound effect, did the sound have an opposite effect, like distract you, um, or take you *away* [emphasis retained] from the virtual environment, or your acting performance?

P2: [00:22:35:08] No, no I think that, was definitely an improvement.

VA: [00:22:38:05] Okay [pause], um, you mentioned that it was, nice to know what the creature would sound like, but you think that the diegetic sound effects added to the *realism* [emphasis retained], of the virtual environment.

P2: [00:22:52:06] Yeah.

VA: [00:22:56:15] Um, do you think, that the disconnect between the animation of the creature, on the wall, and the diegetic sound effect playback, affected your, experience of the—

P2: [00:23:11:22] The disconnect?

VA: [00:23:13:04] —Yeah, so, the timing wasn't exactly perfect on some of the takes, the sound maybe came like, half a second before or after the movement.

P2: [00:23:23:15] Mmm, well from my perspective I look, mostly at the ground, then look up, and by the time, all this things happened I missed most of it.

VA: [00:23:32:10] Okay.

P2: [00:23:33:00] So, no I didn't really struggle with it.

VA: [00:23:38:03] Um, and do think that the performer, immersing the performer into the virtual environment through audio stimuli, like the diegetic sound effects, that I implemented during the shoot *will* [emphasis retained], become commonplace in the film industry?

P2: [00:23:51:12] I wanna say, depends again, on the type of shots you do.

VA: [00:23:55:07] Okay.

P2: [00:23:55:12] If it's a, If I have to do a shoot, where someone shoots a gun, at the actor from the wall, I think the *bang* [emphasis retained] will definitely help, because it's such a, snap timing, if it's like a, like a city I don't need to hear the entire city, because then also the whole crew gets crazy of all the sounds being played the entire day, but if it's like a really, *impactful* [emphasis retained] moment like an important key moment, uh, something that you wanna have time to really precise, I think that will definitely help.

VA: [00:24:28:10] Um, do you th-on that note, do you think, that if you had, sound, playing from the beginning, because there were some shots that we took without the diegetic sound effects, but there was the complete, almost the complete soundscape, would that have influenced, or affected your immersion positively, negatively, neutral?

P2: [00:24:52:09] Um, I wanna say positively especially because we do a, shoot with aliens and you have no clue, if they sound like a whale of a T-Rex or a, I don't know, a cow.

VA: [00:25:04:00] Right.

P2: [00:25:04:17] Um, it definitely helps to get an idea, how big they are, or how far away they are, if they're threatening, if they're friendly, if they're you-you can definitely set a vibe, yeah.

VA: [00:25:16:21] Okay. And my final question to you is, do you think, the time between having this interview and the shot affected your ability to recall, um, accurate memories of your experience of your performance?

P2: [00:25:29:14] Only about the, the briefing question.

VA: [00:25:31:12] Okay.

P2: [00:25:32:10] Yeah.

VA: [00:25:34:01] Thank you, that was, everything.

P2: [00:25:36:14] Okay.

End of Recording [00:25:38:17]

Appendix B3—Interview Transcript № 3

Interviewee: Participant 3

Interviewer: Viktoriya Atanasova

Date of Interview: 27.02.2024

Location of Interview: Breda University of Applied Sciences, Breda, The Netherlands

Duration of Interview: 00:50:00:45

Date of Transcription: 06.05.2024

List of Acronyms: VA = Viktoriya Atanasova, P3 = Participant 3

Note: This transcript was written full verbatim, including pauses, false starts, repetitions, grammatical errors, and non-verbal communication. Altered sections, for the purpose of preserving respondent anonymity, are marked in yellow. Additionally, any unintelligible or inaudible parts of the recording are marked so and highlighted in yellow. Per the application of IPA in this study, the left- and right-hand margins were used for notating emerging themes in the transcripts. As a result, important insights may be marked in blue. The full recording of the interview can be found at the following link: https://edubuas-my.sharepoint.com/:u:/g/personal/191756_buas_nl/EVlp7e69MJxMhFdlfYg3nQBjoy5Eiit2wpTS5Jla2N79Q

Start of Recording [00:00:00:00]

VA: [00:00:00:89] I do have a— Can I have your consent to record this interview, again?

P3: [00:00:05:03] Yes, you have my consent to use this interview, and whatever I say, for your, capstone—

VA: [00:00:11:66] Thank you.

P3: [00:00:11:66] —end project.

VA: [00:00:12:96] Thank you so much. Um. The interview will be divided into three parts. And the first part is just, getting, more of a general overview over your, um, background as a performer slash actor and, similar questions to that, so: What is your performance background or acting experience?

P3: [00:00:35:00] Okay! Haven't been asked this one in a while [smiling]

VA: [00:00:37:38] [laughing]

P3: [00:00:37:38] Um. [pause] So, uh. [pause] I-I actually had an interest in acting, um, in high school or middle school [pause], depends where you live, and, uh, so I did drama, uh, as a [certificate obtained at the end of secondary education], which is, a, [pause] qualification in [country of origin]. Then I did it as [subject-specific qualification obtained at the end of secondary education], which is the-the-the qualification to get you into university. Uh, and then I also, um, was part of a, theatre company called, uh, [name of theatre company P3 was a part of]. [pause] Um, and they're the m-the s-the, uh, jointst, joint, top, theatre company in [country of origin]. Um, so, I did, acting, singing, and dancing, reluctantly [laughing]. The acting was the reason why I went. Um, with them for three years. Um, I was, a extra in a music video for a, uh, [pause] for a-for a, a band. I don't remember the name, I think [name of band, whose video P3 starred in] [snickering]. Um, I've, been, uh, a leading actress in a [unofficial name for film industry in another country] feature film [laughing]. [pause]. Uh, I have done various student projects, um, alongside, um, some projects that are university based, but outside of [pause] my university, so, in [city in another country]. [pause] Uh. [pause] Mostly everything. Um, and then I sort of stopped acting, when I was around [pause] [6 to 7 years ago]. Um, and—

VA: [00:02:26:07] So last year, basically [chuckling].

P3: [00:02:27:14] Yeah [laughing].

VA: [00:02:29:09] [laughing]

P3: [00:02:30:18] No. I don't do as much anymore, it's not actively something that I— Oh no, that's a lie—

VA: [00:02:34:43] [clears throat]

P3: [00:02:34:43] — I did do a-I wa-I was part of a com-comedy sketch [pause] a year and a half ago for a company in [city in the country]. Um, they asked me to do an educational sketch about English grammar and, uh, and they, cast me, to just, be part of the sketch. So. uh, that was—

VA: [00:02:52:15] But your most recent roles have, mostly been, in student projects?

P3: [00:02:57:04] Yeah.

[00:02:57:74] (touchpad click)

VA: [00:02:58:38] Um.

P3: [00:02:58:38] And when I was at [??], university.

VA: [00:03:00:77] In previous roles, but also the ones for student projects, um, I want to mainly focus on your experience in [pause], um, th-for example, the feature film or in the, theatre company, what would you do, to n-prepare for a role?

P3: [00:03:19:03] [pause] It's a good question. Um. [pause] I think, I was never someone, which is why I stopped acting, because I realized I wasn't as invested as I probably should have been.

VA: [00:03:32:81] Mhm.

P3: [00:03:33:26] Um. But, I think, I was never someone who would [pause], like, really sit there and envision the character and envision the motivations, which is something that you should do, in my opinion. Um, I think mostly I would read the script, like, learn the script and then sit and think, "Okay, why am I saying this?" Uh, and like, "What is the reason I'm giving this response?" [pause] Um. [pause] And like, and then that, let that drive what you said rather than thinking, "I'm sad right now". Think like, "Okay, he said this, which has prompted me to say this, which is making me angry because he said this or she said this or they said". [pause] Uh, so I think a lot of the time I would go based on [pause] the script and the-the responses that I would give, based on the character outline that I understood and the context that I was given. But, I, I think, often it would be very script based.

VA: [00:04:28:02] Right, you wouldn't internalize, the character, you would just, read off of what was in front of you.

P3: [00:04:35:12] Yeah, it would just be, "Okay," [pause] um, "What," like, "What do I think, the character would say?", "Does it line up with what they're saying?" Um. Then, sometimes I would ask to say, something slightly different It felt natural because I felt like the character would say that. But I wouldn't sit there and really internalize what that character *is* [emphasis retained] and try and—

VA: [00:04:57:16] Right.

P3: [00:04:57:16] —embody that character? Um. Which I think you should [laughing]. So, uh, I think, if I did more acting now, I would do that.

VA: [00:05:07:94] Um. [pause] You said that's important, but how much, um, of building up the role in your mind [pause] is part of acting in-in your experience or, um, in your opinion? [pause] Like, um. [pause] How much of it is more willed through your consciousness and, how much of it is, direction from the director, or, inspiration from the script?

P3: [00:05:41:11] I think, uh, I think the script does make a big influence. Um. You know, I've not done loads of acting, but, I've done, scenes where [pause] people have said to me, "This is really good," and then other people-and then I've done other, scenes that people have said is really bad. And so, you can look at some of the things I've done and think, "Oh, you know, she's a fairly decent actress," And some of the things, think, "God, she's awful".

VA: [00:06:06:03] Yeah.

P3: [00:06:06:54] Um. [pause] But also [pause], it's also how the script is written, in my opinion. Um, there's only so much, as an actress or a, someone who is acting, you can *do* [emphasis retained], [pause] to make something seem believable, if the whole script is just not believable. Um. [pause] So I think, in my opinion, it really starts with a good foundation of understanding what all the characters are from the director, and from the writer—

VA: [00:06:29:10] Okay.

P3: [00:06:30:07] —and making sure that the script is well written. Because if *it's* [emphasis retained] well-written, and you have a good understanding what the character is doing, um. [pause] A good example was, for example, when I actually also [chuckling] did the voice acting in [name of older VP project P3 was a part of]. [pause] Um. [pause] A lot of people, when I said, "Oh, wh—" [pause] "What's the reason for this", "What's the reason then that",

they couldn't give me an answer. And I'm like, that tells me that, the script is not necessarily well written, and the characters don't necessarily have a good enough background.

VA: [00:06:58:06] Alright.

P3: [00:06:59:07] Because, it should be, clear, the reason why they're making such choices. Because otherwise, as an actress, you can't-you can't [pause] you can't-you *can't* [emphasis retained] embody the character; it's impossible. Because you don't know who the character is, cause they don't know who the character is. You can—

VA: [00:07:12:60] Right.

P3: [00:07:12:60] —make it up in your mind. [pause] Um. not to say it's a bad th— Cause I-I think, [name of older VP project P3 was a part of] was a good script, but it's just [pause], um, I think a lot of it hangs on, actually, how much work is done [pause] by the writer, and the director, and then, obviously, [pause] and then, *then* [emphasis retained] it comes down to the, uh person who's acting it. You know, for them to actually, really, understand [pause] the background, understand the reasons for the decisions they're making. Um. Because there's multiple reasons for why you can do things, you know. A script can say, a certain line, but you can interpret tat-interpret that whole conversation in so many ways. So it's all about, making sure you understand, what your character is feeling, what your character is saying, um, and how-why it's saying, why it's reacting to, it in that certain way to what's being said. If that make sense.

VA: [00:08:08:05] Yeah, if I remember correctly, [name of older VP project P3 was a part of] you actually wrote a little bit of a prequel for it, and did that help you or was that actually the origin of why you wrote it in the first place? Because you didn't feel like you had a good base of your character and, um, her relationship with the, pilot, in the film?

P3: [00:08:28:15] Yeah. The-So for me, I-I, that was part of the reason. It was also because I *believe* [emphasis retained] the actor asked for it as well. He said he would like a little bit more background information of why his character, makes these decisions. Um, uh. And then also when we went on to make the second, uh, [name of older VP project P3 was a part of], uh, it's so important to understand like character development—

VA: [00:08:51:22] Right.

P3: [00:08:51:22] —to know where they're going next. So then it was, uh, we spent a lot of time thinking, "Okay, why did he like [fictitious sport part of the diegetic world of older VP project], coming up with a, like a monologue for *explaining* [emphasis retained] why he-he liked [fictitious sport part of the diegetic world of older VP project] and why that was so significant. You know, explaining why, [name of character from older VP project], like, was so worried about him, explaining like their relationship. Because, you know, you can be worried about someone from a point of, I'm going to lose my job. You can be worried about someone because you genuinely care about them. You can be worried about someone because you think, um, you're in love with them. You can be worried about someone because, there's so many different reasons and they're all can be fairly similar, but it's just a different way [emphasis retained], that you go about it. If I love someone, versus I'm scared of losing my job, is a different way, a feeling behind it, you know.

VA: [00:09:38:14] Right. It's—

P3: [00:09:39:13] If that makes sense.

VA: [00:09:39:95] Yeah, one is, really doing it because you have to do it, and the other is, doing it

because you want to do it in a way?

P3: [00:09:46:04] Yeah. Then one-one is out of fear and the other is out of love. And that's generally speaking, a lot of the time why we make decisions. Well, emotional decisions; it's out of fear or out of love. And um, and so one is out of fear, one is out love. So, obviously, technically, both are out fear, but one is more heavily on the fear side. Cause it's like I'm scared, that he's going to go somewhere, because I'm scared of losing my job and *that's* [emphasis retained] all I care about, you know? I-You know, I don't care if he comes back and, has some sort of accident under somebody else's, management, but I care that he gets back.

VA: [00:10:20:11] R-Right, it's different motivations—

P3: [00:10:22:46] Yeah.

VA: [00:10:22:46] —for the character.

P3: [00:10:23:23] Yeah.

VA: [00:10:25:11] Um. When you *are* [emphasis retained] acting, what elements, like physical props, makeup or costumes, do you find important to be present in order for you to be more engaged with the role? This is like outside of the script, [pause] these physical things that will just help you, ground yourself in the role.

P3: [00:10:47:11] Um, for me, something I've realized, uh, when I was, doing the theatre workshop as well, uh, we would do a lot of like, miming? So we would do a lot of like, "Okay, I'm pouring the tea," but I don't have any form of teapot or kitchen—

VA: [00:11:02:09] Right.

P3: [00:11:02:09] —I'm just miming it. And I always would find that *so hard* [emphasis retained] to [pause] imagine. Because, I think, if you're actually pouring the tea, you're also thinking about other things. So then you may be pouring the tea, maybe you stop for half a second, but it gives you. But if you're *miming it* [emphasis retained], you're kind of more bothered about making the mime look realistic and not about the actual [pause] *Action* [emphasis retained]. Um, and that-that, for me, I-I really like it. If I can interact with something, if it's *someone* [emphasis retained]. Or, um— But if-if I'm supposed to be, for example, hitting them over the head with a *bat* [emphasis retained], but I have to pretend that I've got a bat, I've really struggle with that. Because I just sort of [pause], I think having the item in your hand or having, whatever you're supposed to be acting with in your hand or in-in the vicinity [pause] gives you the feeling of, it being real.

VA: [00:11:54:12] Right.

P3: [00:11:54:14] And then you put it towards-towards that. I don't-I'm not saying I need everything, or like a full on set *of full props* [??], but just [pause] some small feeling of what

the scene is. Like even if it's just a table, with a kettle, on it, that's *enough* [emphasis retained] for you to go, "Okay, we're in this environment," you know.

VA: [00:12:13:03] Right.

P3: [00:12:13:03] Um. So I-I-I like it if there's a few props, or at least I can have, some idea of what the scene is.

VA: [00:12:22:03] Um, things like makeup and costume, did those have the same-similar effect, as well, or do you feel that they don't have as much of an effect because they're more on you and you can't really see them or, interact with them?

P3: [00:12:37:02] I think, if I'm honest, I think, everything, that, uh, someone who acts has on them is important. Uh, for me, I've-I-I feel like, like for example, with the shoot with [name of director of VP shoot used to facilitate data collection], um, having that jacket on, having those trousers on, having, like, my boots on—

VA: [00:12:55:05] Yeah,

P3: [00:12:55:05] I-I-I was in the morning deciding, "Okay, do I want to put boots on or just my trainers?"

VA: [00:12:59:15] Yeah.

P3: [00:12:59:15] And then I was like, "No [emphasis retained], I'm going to put the boots on," because it gives me that feeling of authority. It gives me that feeling of like being in the army. It gives that feeling of like, I'm like going out somewhere, there's [??] somewhere and I'm going to fight a battle. It gives the feeling of like, trudging through nature of, and um, And, a certain— The same way. If I put on my walking shoes, I now instantly have this feeling I'm going for walk. I-I feel more like, "Okay, I'm ready to walk." - If I'm putting—

VA: [00:13:24:23] Yeah.

P3: [00:13:24:23] —on my exercise trainers, I, I feel almost more springy. I'm like, "Okay, I'm going to do some sport." And I think, a-a costume can really make you feel, in the same way if you're-if you're doing a period piece and I was in a corset—

VA: [00:13:37:03] Yeah.

P3: [00:13:37:03] —I would instantly feel like I need to sit up more right, I would change my posture, I would change my position. -And-and you can still do that without it—

VA: [00:13:44:09] Yeah.

P3: [00:13:44:09] —but I think that costume makes you, in the same way that they say, um, there is a reason why people wear heels, because it gives you that feeling of power.

VA: [00:13:55:10] Right.

P3: [00:13:56:04] And for some people, wearing heels really does give them a s-feeling of power. It gives them th-i-it's, um, like it gives you, at least, like from what I've heard from people that, you know— And there's a reason why people wear suits, you know, to big meetings. It's not because, sometimes it's because I really feel like they wanna look smart.

But for me, if I ever wear a suit, I'm wanting to— It makes me feel more powerful. It makes me feel like—

VA: [00:14:19:05] You can project something.

P3: [00:14:20:04] Yeah, it makes me feel like I can, fulfil a position even if I'm not confident enough to do it. Having *that outfit* [emphasis retained] or costume will make, me, and my, brain, at least a part believe.

VA: [00:14:33:13] Yeah.

P3: [00:14:35:06] [pause] That I am like, "Yeah, I look great in the suit," Or like, "Yeah, I look, I look powerful today" like, or, you know, Or, uh, "Oh, yeah, like I'm-I'm in my army costume", Like, um, I'm like, "This is how it must feel". Like, "Oh," you know, "How does it feel? It's quite weighted". Like I feel the weight, I feel, you know, I feel, I feel the-the, you know, you just sort of feel a little bit more feeling of what the character would feel. And-and [chuckling] I think for me, costume, [pause] if anything, actually, I think costume and makeup is even more important realistically. Because if you have that outfit on, you feel like you are the character.

Like I was [??]—

VA: [00:15:10:07] - Right, you're putting the skin of the—

P3: [00:15:11:65] Yeah!

VA: [00:15:11:65] —character on

P3: [00:15:12:65] Yeah.

VA: [00:15:12:65] Puts you in the right headspace.

P3: [00:15:14:01] -Yeah.

VA: [00:15:16:15] Um, I wanna just go back, um, to what you said earlier, that the *miming* [emphasis retained] almost distracted you because you were focused so much on the miming. And, do you have a similar feeling when you're getting, too much direction, uh, from the director? I can relate it, for example, to, um, the shoot that we did, a few weeks ago, the one that we're going to talk about. [pause] You had to time, the head movements, and your actor w-really wasn't, saying much or we couldn't really see their facial expressions as well. So, for you it was— Or for the, purpose of the shot, it was really important that you would get the movement correct. But would something like that, in a normal production, take you out of the role, if you had, too much things to consider.

P3: [00:16:05:03] If it's, uh, if it's too much of like, "Okay," like, "Wait a second, wait a sec. Okay, go, go, go, go and stop and turn", then it almost becomes a dance.

VA: [00:16:17:07] Right.

P3: [00:16:17:07] Like, uh, the other week for me, it was just like, "Okay, I've got to do this, this, this, this, and I've got to look a certain way" like [they have their], like, because I was-I was mirroring. It-I was-wasn't acting in my opinion—

VA: [00:16:29:90] Right.

P3: [00:16:29:09] —that was mirroring. Like, I was looking at what someone else was doing and I was mirroring it. I had no emotion, no feeling of, what I should be doing or why I'm doing it.

VA: [00:16:38:15] Okay.

P3: [00:16:38:15] I have no idea, what **the thing [??]** was, what the context is of why **[they're]** even at the glass. Like, I had no idea of what **[they]** said. **[Were they]** happy? **[Were they]** excited for like a sort of, finding? It was mirroring and emotionless. That's-that's, there was—there was nothing really to it, uh, it was just copying, so. Obviously in a normal shoot, you would ask for context, because there would be more to it, and there would be, probably, some sort of conversation, or at least some sort of interaction, and you would be given that. But for *this* [emphasis retained], my job was not to, be the character? My job was to reflect a character. And-and-and, you know, and then therefore you can't—you can't, you just have to do what you see on the screen, which is very different. It's a very different form of acting. It's not, well it's not really acting, to be honest.

VA: [00:17:29:99] Right, mirroring. Um, the next few questions, uh, will be about VP.

P3: [00:17:38:10] Mhm.

VA: [00:17:38:14] Um, my first question is, have you ever been in a virtual production?

P3: [00:17:43:15] [laughing]

VA: [00:17:43:15] [laughing]

P3: [00:17:45:10] Um. [chuckling] Well, as a- as an **[actor]**, I'm assuming or is, uh—

VA: [00:17:49:05] Uh, yes. Pf-purely focusing on you as an actor.

P3: [00:17:54:07] Uh, technically not, as an audio, uh, as voice over, uh, voice **[actor]**, but that's not really, it was not influenced by the stage. So no, in that sense, no. Well, that's a lie. I did the, cycling for **[name of colleague]**'s shoot, so, I have. And also with **[name of other colleague]** walking through the warehouse. So yes. Yeah, yeah, I have.

VA: [00:18:17:09] Okay.

P3: [00:18:17:09] Yes. Then technically, yes. [chuckling]

VA: [00:18:20:10] Uh. What are your general thoughts on working in a virtual production, as an **[actor]**?

P3: [00:18:26:01] I think it's, unbelievably different compared to working in a green screen or, working with [pause] an environment that's just, not there. Um. Although at times, as a person acting, you don't even see it because it's behind you. You at least can get, an understanding of what the lighting's like, what the mood is like, what it looks like, um, the space that you work in, the space you live in, how grim it is, how clean it is, how-how, you know— A lot—all of those different things influence, how you are, uh, or how you would act or

how you would feel as a character, so. Um. [pause] The— It's just a lot more immersive. It's a lot more, makes you believe it much easier.

VA: [00:19:13:14] Um, and how does it differ from a traditional film set or a theatre, um, production, in your opinion?

P3: [00:19:25:02] Uh. [pause] Well, uh, in terms of a traditional films, it just depends on how *much* [emphasis retained] set you have. Um. Because [pause] obviously, if you can actually [pause], you know, uh, like the big Hollywood films where they-they use virtual production, where they build a whole boat and-and integrate it with the screen, then, in my opinion, it's always gonna be better, because the screen is replacing a green screen.

VA: [00:19:52:00] Right.

P3: [00:19:52:05] But if you're working on location, and everything's there, Like, oh, I worked as a-a location manager on Dunkirk, and the actors and the extras there had the whole harbour, they had the actual ship, um, you know, they had the actual food, the actual rations, the actual um-um-um cars; there was gravel all on the roads. In my opinion, [pause] you know, *that* [emphasis retained] is probably the *best* [emphasis retained] immersion. Because you, you know, the stage will always, not feel 100% real, *unless* [emphasis retained] there are, I mean with the ship, I mean they said that they really did feel real, because, uh, you know, the actresses, and the, actors, um, got seasick, on the boat, in 189. 1899?

VA: [00:20:35:10] Yeah.

P3: [00:20:35:10] 69? [Unintelligible – 00:20:36:18]

VA: [00:20:36:76] 99.

P3: [00:20:38:01] Um, they got seasick, so. I think it *can* [emphasis retained] feel real. Um. [pause] In terms of, compared to on location, um, I think it— I don't know if it offers anything more in terms of immersion? Just simply because, um, the biggest difference is that if you don't-you don't have to travel to all different locations. But in terms of, like, the theatre, obviously, uh. Yeah, it's obviously a completely different medium anyway, um. But it is obviously a lot more immersive, unless, obviously, I mean, even if you have all the set pieces, it's just it's-it's , uh, it's-it's not-it's not the same, you know what I mean, um. Yeah, I, hm, it's just a completely different, you know. I think, it offers more possibilities, it offers more possibilities to,uh, allow for, like, closer to, like, realism. Obviously, with theatre, it's never going to look real.

VA: [00:21:40:09] Right.

P3: [00:21:40:09] Realistically, like, not it-it *can* [emphasis retained] look real, but you-you will always know it's not real. But with the-with an XR stage, obviously, it can really make you feel like you're in a real environment? To a certain extent. Um. [pause] Yeah, uh, so I-I, yeah, I would say on location and XR stage a fairly similar, theatre and obviously XR stage, XR stage offers more possibilities for real-realism. And then, with regards to green screen, more immersion, more, uh, uh, yeah more immersion, yeah.

VA: [00:22:16:10] But nothing beats, being on location.

P3: [00:22:20:11] It depends. It depends on *how* [emphasis retained] it's put together, because if you have a full on sho-ship and then sea is, and it *wraps* [emphasis retained] around your peripherals, then of course—

VA: [00:22:32:01] Right.

P3 [00:22:31:11] —that's gonna to be, really realistic, and also that it's a controlled environment—

VA: [00:22:35:10] Then you can actually film it.

P3: [00:22:35:17] —yeah, and-and so then therefore, I probably lean, towards that option but there's obviously reasons why, *but* [emphasis retained] if I was to say, you know, the shoot I did with [name of co-star from previous VP project] were we're filming in a warehouse, I would feel more, immersed if it was an *actual* [emphasis retained] warehouse. So, I would choose an actual warehouse, over the screen on that, particular occasion. But if you obviously it's on an alien planet, and your only option is to do green screen, or the XR stage, I would *obviously* [emphasis retained] choose the XR stage. Um, so—

VA: [00:23:06:11] It depends.

P3: [00:23:08:00] —It depends.

VA: [00:23:08:20] And the degree of the, um, technical, limitations.

P3: [00:23:14:20] Yeah.

VA: [00:23:16:20] Um, your-you did mention that yo-uh you struggled with, preparing, for your roles as an actor, um, but, a-does the *process* [emphasis retained], differ for you in any way, for virtual productions or acting in virtual productions?

P3: [00:23:39:07] Uh. [pause] It's a good question. [pause] Not really, no. I feel like it's pre-fairly similar.

VA: [00:23:59:12] Right.

P3: [00:24:01:09] Um, in both cases I would be interested to see at the locations that we would be filming. Both cases I would, look at the script and ask for context based on the characters but—

VA: [00:24:11:12] Yeah.

P3: [00:24:11:20] —it wouldn't change anything really.

VA: [00:24:16:07] Um, do you think that *your* [emphasis retained] experience with virtual productions, af-virtual production affected your performance during the shoot? Um, in a sense that, you already have a lot of experience with VP, and, maybe, the illusion of the screen, is already kind of broken, for you so you *don't* [emphasis retained] see, the novelty of it you're not as immersed as maybe you would have been if you were doing it for the first time.

P3: [00:24:47:00] Yeah I would agree with that, I would totally agree with that I think the first time, I came onto, the set for [name of older VP project P3 was a part of], I was like, *whoa*

[emphasis retained], like you literally can walk into this I was just so blown away and I just kept every day I was like turning it on and like this is incredible and *now* [emphasis retained] I turn it on and it's like, oh, my job—

VA: [00:25:07:06] Right.

P3: [00:25:07:12] —you know it's-it's not, necessarily, necessarily something special for me anymore. Um, I enjoy showing it to people and I enjoy, working with it. But I see its limitations now, I see its limitations as well as its positives, um. But I definitely don't *believe* [emphasis retained] it's real anymore like I don't have such a, wow [emphasis retained] effect and I-I can see [emphasis retained], the actors and actresses that we have they come in, how great they find it, and how like, ah, this is crazy, this is so good, and I just don't have that reaction anymore, you know, I-I, I still I'm always like with [name of director of VP shoot used to facilitate data collection], actually when he had the hands, an-and the ink, I genuinely, for the first time in a while, remember when the first time we [??] a screen I looked up and was like, whoa—

VA: [00:25:57:08] Um, that's interesting.

P3: [00:25:57:11] —like that genuinely looks so [emphasis retained] good, like, it was the first time in a while that, um, because sometimes I find, I'm struggling to actually, make it not look too gamey, because we've *not* [emphasis retained] really done anything that, really tricked me—

VA: [00:26:13:11] Right.

P3: [00:26:14:07] —still, and actually looking at, what [name of director of VP shoot used to facilitate data collection] put together with [name of assistant 3D artist for shoot used to facilitate data collection] and obviously, uh,

VA: [00:26:19:21] [name of main 3D artist for shoot used to facilitate data collection].

P3: [00:26:20:25] —[name of main 3D artist for shoot used to facilitate data collection], yeah, she was also involved, I'm trying to think who was also involved because I come in and out, I don't know. Um, and obviously you've obviously done sound as well, but, um, act-yeah, [name of main 3D artist for shoot used to facilitate data collection] was obviously the main person. It's just insane, It's just it looked so good.

VA: [00:26:37:01] Do you think *because* [emphasis retained] you were less involved, especially, with the creation of the virtual environment that it was such, um, a positive effect on you when you did finally see it?

P3: [00:26:50:02] Maybe, uh, I can't say for certain, but I will say, I don't know how they did that, and so therefore my brain was like—

VA: [00:26:58:02] Right.

P3: [00:26:58:15] —this really does look like alien hands behind a glass like it's so cool. And I just genuinely, I know obviously it was probably something to do with the sequencer, and animation and I was like, okay like, I could, take a strong guess um—

VA: [00:27:10:22] Right.

P3: [00:27:12:12] —but *not* [emphasis retained] actually seeing it in Unreal, makes you sort of think, there's kind of mystery behind it maybe.

VA: [00:27:19:14] Yeah.

P3: [00:27:19:14] Ah—there was a little bit of me that, like if it, the was one thing that broke it was the loop.

VA: [00:27:26:01] Right.

P3: [00:27:26:10] Because it looped, you just have in your head oh this is just the sequencer running, or its eh, but if it didn't loop, I would, there would be a part of my brain that would *slightly* [emphasis retained] believe it, but I—that, that broke it for me but, I still was, so [emphasis retained] impressed by how close they got it to the original.

VA: [00:27:44:09] Um, and do you, do you always, find yourself doing that like, sort of explaining yourself in your head, uh, trying to figure out *how* [emphasis retained] it was done? Um, something to do with the virtual environment for example like, you saw the loop and you were like okay, this is a sequence or like the sequencer, or whatever it's called. Do you, do that a lot?

P3: [00:28:08:23] Um, not necessarily, I do like to know, um, I've only done it once and that was when [name of assistant 3D artist for shoot used to facilitate data collection] did like the growing vines, um, and I wanted to know, how he did that, um. I'm trying to think if there was any other times, um.

VA: [00:28:25:12] Like not necessarily *asking* [emphasis retained] other people how it was done but, because you have an experience, when you see something you're like okay this was done, through this way, which i-uh, in a way contributes to, uh, breaking the reality.

P3: [00:28:41:11] Yeah maybe because I think also because I teach in it, and I'm the person at the moment that teaches, Unreal, huh, that, if, if someone asked me hey like this possible? I wanna be able to say yes, I've seen it, I know it's like this, I don't know exactly, but you can either YouTube it or you can speak with [name co-star of shoot used to facilitate data collection] or [name of assistant 3D artist for shoot used to facilitate data collection], or we can, look at it together, I can find out, come back to you. Um, so for me a lot of times there's something that I see that I've *not seen* [emphasis retained] before, I'm always like okay how does this work? And, usually I will try and find out I didn't with [name of director of VP shoot used to facilitate data collection]'s shoot I didn't ask, cause I was just like, ah, well, I just didn't. Um, but the other two times, maybe more, that I've been intrigued, I've, I've asked. Um. Yeah, it's just always interesting to know.

VA: [00:29:32:04] Um, during [name of director of VP shoot used to facilitate data collection]'s, shoot—

P3: [00:29:34:19] [??] about it, yeah.

VA: [00:29:35:04] —um, the [name of VP shoot used to facilitate data collection] scenes, there wasn't *much* [emphasis retained] of a physical world, however, what were your

thoughts on the relationship between the virtual world, and the physical world, during your performance?

P3: [00:29:49:04] Um [pause]. Like wha-what, what? [pause] Um, as in what, what did I think, about how, they related to each other or how like uh.

VA: [00:30:08:10] Yes, how well they blended together or, how they related to each other.

P3: [00:30:13:10] Um, yeah it's difficult, because obviously, there was no real, physical set, uh, but there was no real physical set in the shot we would like, there was-they were trying to replicate, so in that sense, yeah that's a difficult one to answer, because, I wouldn't say there was necessarily, *any* [emphasis retained] relation, other than, me, and then that would be lighting, and how that was done. Um [pause]. So, yeah I didn't really think about it, didn't really, um, yeah, it would be something I would be able to analyse really, just cause it didn't, really uh, exist, so to speak.

VA: [00:30:58:06] Um, yeah, understood. Um, after noticing, the loop several times, after each take did you feel, more and more disconnected from the virtual environment?

P3: [00:31:11:01] Yes. That I can say for definite.

VA: [00:31:14:00] Yeah.

P3: [00:31:14:18] Becomes a little bit more tiring, and then you're just like okay I just want to get this over with now, not over with, cause I enjoyed it, because I was actually really happy for [name of director of VP shoot used to facilitate data collection] that it looked really good, and I *wanted* [emphasis retained] to make sure that he had the best result possible.

VA: [00:31:25:11] Right.

P3: [00:31:25:25] So it's more of a drive from, yeah, friend, slash, like, colleague slash, teacher slash whatever you want to call it, perspective, that I wanted him to have the best result possible because that's what he deserved. But, at certain point yeah, yo-you know it's not real, you're just, yo-you, you know roughly when the loop is going to start, and you start to sort of, it just feels slightly less, uh, less impressive [chuckling], well, I don't know, not impressive but, less, *real* [??].

VA: [00:31:59:14] Um, outside of that, did you find anything else, limited your performance, during the, production?

P3: [00:32:08:04] Uh, what you said already, the one *biggest* [emphasis retained] thing is the the, the whole, you *have* [emphasis retained] to turn at this moment.

VA: [00:32:17:00] Right.

P3: [00:32:17:06] Because I wouldn't normally, I would turn when I feel, I need to turn.

VA: [00:32:20:12] Yeah.

P3: [00:32:21:20] And, um, um, or I would make a *reaction* [emphasis retained] based on what my character's feeling in that moment, and what I, um, you know, because for example,

when the alien knocked on the glass, before that, obviously, it made some other movements and I might have started to step back.

VA: [00:32:40:06] Right.

P3: [00:32:40:14] And then when it like tapped, I would have like probably like jumped, but I *don't* [emphasis retained] think I would have looked back straightaway it depends on what, because I didn't know any context of the character so not knowing anything about the character, and, the whole rigidity of what I had to do, is why I say it was mirroring, because, I didn't act [chuckling].

VA: [00:32:58:01] Right, I think in the—

P3: [00:32:59:10] The *only* [emphasis retained] real thing I felt that whole time, I-I'll tell you later, because that relates to what you're—

VA: [00:33:05:14] Okay, we'll we'll—

P3: [00:33:07:14] Yeah, yeah, yeah.

VA: [00:33:05:15] —in, a few questions we'll get to that part, uh but, I think in the in the, in the scene that they were trying to replicate that, was, not the, woman's first time seeing the, the alien, so, it but if it were maybe your reaction would be, um, accurate representation. Um, are there any suggestions you could make to improve your experience of the virtual world during your performance, that day?

P3: [00:33:37:09] Um, looking back at it, I sort of do wish, I'd asked [name of director of VP shoot used to facilitate data collection] for, context of the character or watched [name of movie related to VP shoot used to facilitate data collection] before, but then I'm like, maybe I would have been too, even more rigid then because I know *exactly* [emphasis retained], you know at least *now* [emphasis retained], I was sort of feeling what I was feeling you know, and kind of being my own character.

VA: [00:33:56:06] Right.

P3: [00:33:57:03] Um, but a-it's, it's a difficult one I think, as an example of acting in Virtual Production, it's not, it's not the best cause like I said it's just in my opinion it just, [??] acting, um, because it, it wasn't like, I, uh, it's like, usually your, your director can give you directions,

VA: [00:34:17:08] Right.

P3: [00:34:17:15] but for example if you do it half a second too late or, too early it's-not it's still gonna be or if you, make a mistake and it feels real, it's fine but in this situation if I made a mistake but I felt like it was the right *thing* [emphasis retained], we had to redo it. So, um, it's a difficult question to answer really, because I think, there's a *lot* [emphasis retained] of things I would do differently if I was actually acting and this was a scene that [name of director of VP shoot used to facilitate data collection] had came up with.

VA: [00:34:42:10] Uh, do you think that potentially, if it hadn't been, um, a time sequence for example, but the virtual environment, however that would be done, was more interactive so that you *could* [emphasis retained] play around with the character. Would that be, um, something that you would, um, like or, think that is better than what was?

P3: [00:35:06:00] Yeah, yeah, I think, uh, um, the thing is for what [name of director of VP shoot used to facilitate data collection] wanted to achieve I wouldn't have staged anything. I would have mad-made, made the loop slightly longer but that was for-the the point of actually then, um, [name of main 3D artist for shoot used to facilitate data collection] and him didn't have so much issues with like, oh, we need to, we need to make sure we start it, in the middle of the loop, um, from my perspective obviously like [pause], yeah if, yeah you can't because it-it's one action that's being looped,

VA: [00:35:37:07] Right.

P3: [00:35:37:12] But obviously, the movements of the hands if they didn't [??], and, then obviously you'd feel a little bit more, it would feel a little bit more realistic, maybe you'd be a little bit more immersed, but, it-it's difficult to say.

VA: [00:35:50:03] Um, do you think immersing the performance of the virtual world through visual stimuli, like the LED wall, will become commonplace in the industry?

P3: [00:36:00:13] Yes, yeah I do. Uh, I think, in the last, by it started in 2019, um, I think we've already had a huge increase, and I think in the coming five years, also linked in with AI obviously, I think, more and more productions would be do-done in this way,

VA: [00:36:16:14] Right. And would you be interested in acting in, a virtual production again?

[both chuckle]

P3: [00:36:22:11] Yeah I would be, I think it's, uh, I would be interested to actually do, a short film and actually act in it, and see from that perspective, I think it would be interesting.

VA: [00:36:32:07] Not only as a supervising lecturer—

P3: [00:36:35:03] Yeah.

VA: [00:36:36:23] —uh, one minute [pause]. Um, this next part of the interview will be focused on the implementation of the diegetic sound effects during the shoot, um, my first question is do you believe that, your briefing, before, um, the shots, with the added, diegetic sound effects was sufficient?

P3: [00:37:18:04] As in the briefing of what to expect?

VA: [00:37:20:02] Yeah.

P3: [00:37:22:03] Uh, I maybe would have liked more information because I, I, it's something that I realized and I should have told you, um, but it was sort of something that, once I'd seen it once I knew what to expect, but I realized, um, the first time we did it with the diegetic sound, um, effects, um, when we started acting, I was expecting sound. So I was like, oh, there's no sound, and so instantly I was thinking about the fact that there was no sound, and then there *came* [emphasis retained] sound, and then I was like, oh there's the sound, and then I was like, oh I'm supposed to react to the sound, and then it was like, oh, oh but it's gone now, oh, okay. So like the first time I didn't really, didn't influence anything because I was just so, confused why I didn't hear anything—

VA: [00:38:02:03] Okay.

P3: [00:38:02:19] —and then I did hear something, and then I was like, oh, it's linked to that but then I, that was maybe my fault maybe I didn't, like I could have, uh, asked, more questions but in my head it was gonna be more like, the *whole* [emphasis retained] thing was gonna have sound. And so I-I, I was kind of confused why there wasn't any sound.

VA: [00:38:21:15] Right, um. Do you think that, um, because you were so focused on the absence of sound and then the *presence* [emphasis retained] of sound, it almost took you out of your role?

P3: [00:38:32:09] A little bit, on that on the first time round, the second time round, the one thing I did, i-it did sort of, was, I think if, I remember quickly the first time round, I heard the sound, and it almost made me go, uh? Like, but that was, like, did it just knock on the glass? Like, I genuinely was like, confused, because I, I was waiting for sound, and then I heard the sound, and then it sounded like that sound, and then I was like, was that actually that sound? Or was that sound I was supposed to be hearing? So it was kind of both [pause], effective, as well as being, kind of—

VA: [00:39:11:00] Distracting

P3: [00:39:11:09] —distracting, yeah.

VA: [00:39:14:09] Okay. Um, do you think that hearing the diegetic sound effects before your scenes, would *have* [emphasis retained], um, an impact on your level of immersion? So had you heard the, the knocking for example, *now* [emphasis retained] you can recognize that, now you wouldn't be confused yes it's coming from the screen, but would it have, um, an impact on the level of immersion because, you knew what you were, looking at?

P3: [00:39:41:13] Well the thing is, is, this, um, I think hearing it beforehand is maybe not necessarily, great for immersion anyway, it was more for me, because of the fact that I was expecting sound the whole way through.

VA: [00:39:53:00] Yes.

P3: [00:39:55:00] Um, If I, if I, if I, I don't know why I thought that, but if I realized, oh, it's only a *part* [emphasis retained], then, uh, or like, you know, we're going to be, you know re-reinforcing the knocking, so there's going to be like, and then, uh, then I would've been like okay, and then cause the second time round, when he *knocked* [emphasis retained], it actually made me jump, a little bit like a, a little bit I felt my heart go up, which I didn't have on the other two other times. So, um, but it made me jump in a way of, my gosh that really does feel believable, I-It *added* [emphasis retained] something, It really did add something, and that's something that I, truthfully I can't say added to my acting, just simply because I just *genuinely* [emphasis retained] couldn't react to it, in any way, because I had to tell you at a certain point—

VA: [00:40:38:09] Anyway.

P3: [00:40:39:09] —anyway, but, it did make me believe, it was real. I'd gotten to a point where I was like, loop, loop okay let's go again, and then all of a sudden, it added another element that made it feel more realistic.

VA: [00:40:52:08] That you went earlier.

P3: [00:40:54:02] Yeah, yeah.

VA: [00:40:56:05] Um, and, so do you think that, if you *had* [emphasis retained] the sound, playing from the beginning even the beginning of the shoot, that maybe you wouldn't have this issue or that you would be, immersed, the whole way through?

P3: [00:41:09:14] Um, it's difficult to say but I definitely think it's more immersive. I think if I compared both, it definitely makes you feel, it makes it feel more realistic, it makes you feel, you know how *hard* [emphasis retained], the tapping, yo-you can, i-it's like also the fact that you *know* [emphasis retained] it's glass, cause you hear like the, tunk tunk tunk, like, you-you hear it, um, it also makes you feel a certain way because depending on *how* [emphasis retained] they knock, instantly I was like, oh, it's just as if, you know, like it's as if someone's just knocking in the window saying hey I'm here, like, you know? And so then you kind of get this feeling of, you know why they knocking on the window like that, it's-it's, it's an almost intriguing, and I think if you have like a *harder* [emphasis retained] more aggressive knock then, although you could see, but also because, the finger of the alien was kind of doing, a sort of, explain this in words—

VA: [00:42:03:00] Flick.

P3: [00:42:04:10] —like a flick movement, you sort of almost think that they're kind of, like pointing at something or telling you to go away and, when you realize they're knocking on the *glass* [emphasis retained], and you hear it, you're like, oh, they are knocking so that it *is for me* [emphasis retained] because I'm standing here, and, uh, and you can put more, more believe into it I think.

VA: [00:42:23:00] Right, *before* [emphasis retained] the added sound effects, you almost didn't, um, realize that the glass was there but once the sound effect was added—

P3: [00:42:33:05] So it reminded you, yeah.

VA: [00:42:35:02] —um, and on that note of the, the sound of the glass do you think that the dynamic range, meaning the difference between the, quietest and the loudest sound, of the diegetic sound effects was believable?

P3: [00:42:50:10] I think so, I think, the only issue, we had, is it was, an only issue I'd say is it, It was, quite short, and speakers in there obviously with the screen, it echoes a lot so you, you do, you don't hear it as clearly, as maybe you would if, if the speakers were lower, or if, uh, so, um, I thought it was a very good sound effect, I thought i-it was believable, but because I could kinda hear it was coming from those speakers, um, yeah I would say be a, dynamic range was then affected, by that as well, you know.

VA: [00:43:29:08] the hardware of—

P3: [00:43:31:02] Yeah.

VA: [00:43:31:18] —the stage.

P3: [00:43:32:02] Yeah.

VA: [00:43:33:12] Um, did the use of the added, diegetic sound effects affect your acting performance in the takes, after, the ones that we used the sounds in?

P3: [00:43:44:00] Um, I don't know if we did do-do any takes, uh, did, after that without the sound, but I know, I remember, very vividly, that I more *aggressively* [emphasis retained] turning towards, [name co-star of shoot used to facilitate data collection], like more like, a little bit more, like what is this, you know like, you know, it was almost, like before I was like okay, um, point and turn, like and this time it was like okay knock on the glass okay [name co-star of shoot used to facilitate data collection] like, you know, what is this, you know what I mean and, um, so I think, I felt like I was, turning more rapidly and, and maybe, it was more prompted by what, the alien was doing because the sound effect rather than, what [??] the alien was doing, and tha-is that the right time to turn.

VA: [00:44:31:13] Right, not so much because you were supposed to but because it felt natural.

P3 [00:44:34:13] Yeah, a little bit, a little bit. But that's obviously because, it's rehearsed anyway—

VA: [00:44:40:03] Right.

P3: [00:44:41:03] —but it definitely, uh, yeah.

VA: [00:44:45:04] Um, did you think that the disconnect between the animation, on the screen, and the diegetic sound effects playback affected your, experience, of the, sound effects?

P3: [00:44:57:11] So—

VA: [00:44:58:11] Uh, there was I thi-believe, one take, were it didn't, exactly match up, the sound was a little bit before a little bit after the, knock.

P3: [00:45:07:08] Yeah, that was the [??] uh, that was I think the first one, because I think, I remember going, oh, it's out of synch but I was, so bothered about the fact that, oh, *that's the sound* [emphasis retained]—

VA: [00:45:16:01] Right.

P3: [00:45:17:01] —that I just genuinely, was already out with it anyway—

VA: [00:45:20:01] Okay.

P3: [00:45:20:08] —so, uh, but there was a-a still a little piece of me that, did sort of double take, with the glass cause I, uh, yeah because, I didn't know what to expect. So, I think then if you don't know *exactly* [emphasis retained] what sounds going to be, then, uh, yeah I don't think it, it, it was too much of a problem. Uh, it does make it difficult though, because obviously, if the second time rou-round it hadn't been, on the right time, then I think I would have started to think, okay like, is are they're gonna get it right like, I would've been more worried of, oh, come on, [??] *get it right*, you know you can do it, like more like I wanted *you* [emphasis retained] to get it right not for my I don't care I'll sit there all the time and do the same action, but, yeah I think if, if it gone, not wrong but like if it hadn't been sunk, like synch

together, a few times then I think I would have been like, okay, I'm more bothered about is it actually synched up right than actually—

VA: [00:46:19:07] Worrying about your performance and the effect of the sound effect.

P3: [00:46:23:00] —yeah, yeah.

VA: [00:46:25:08] Um, do you think immersing the performer in the virtual world through audio stimuli like the diegetic sound effects, will become commonplace in the industry?

P3: [00:46:36:02] I think it's a really good technique, um, I hadn't heard too much about it before but I, I *a/ways* [emphasis retained] actually said, which is funny, I always, uh, like sometimes, I should have said this sometimes before, an emotional, uh, I did a the- oh, I did a theatre performance in Edinburgh **?? Festival** was one of the biggest, uh, acting festivals in the UK, um, it was really, emotional, theatre performance, and at the end we all had to cry.

VA: [00:47:03:05] Okay.

P3: [00:47:04:04] And ideally you would have to cry [chuckles]. And, uh, every time I would do that, I would listen to something really sad, before I started performing.

VA: [00:47:13:04] Right.

P3: [00:47:14:04] And, you have to hold it the whole performance, but at the end, it makes it much easier, and then they would *play* [emphasis retained] sad music, so they would play like, there was a song that they were playing, and I would pour my eyes out, but we did that rehearsal without that music and I didn't cry, couldn't cry, couldn't get it out of me. And so I always said, oh, if I could actually have sound [emphasis retained] with every acting I did, I would be *much more* [emphasis retained] believable. And, uh, and I think, there's just so much that you get from sound like so much emotion, so much feeling, so much believability, um, that for me, like if there was a possibility to have this on every shoot and like, almost like overlay the like the dramatic music of like an action scene over the actual action scene.

VA: [00:47:56:15] Yeah.

P3: [00:47:57:06] Because it really makes you *feel* [emphasis retained] like a certain way. It really can make you, cry or, like you know give extra like anger or, you know, run with more power or, and, um, so I hope so, I think it's a-a really immersive way of a-acting, uh, I just wonder *how* [emphasis retained] it would be possible, to do that and record audio at the same time.

VA: [00:48:20:10] Right, I mean it would be interesting because, I am focusing on immersion in the virtual environment, but it has so much, be-added benefits for the, emotional performance—

P3: [00:48:30:10] Yeah.

VA: [00:48:30:15] —of the actor. Uh, and my final question, do you think that the time between having this interview, um, and the shoot affected your ability to recall your memories, of your experience accurately?

P3: [00:48:45:08] I think obviously always, if you do it straight *after* [emphasis retained], then you're obviously always gonna give maybe a much better account of *exactly* [emphasis retained] how you felt throughout the whole thing.

VA: [00:48:54:00] Right.

P3: [00:48:55:07] Um, but I really paid attention to it. So, um, you know, I paid attention to well [pause], well I wouldn't say paid attention to how I was acting, before the sound, but, uh, I *remember* [emphasis retained] I know very clearly that I did feel a bit like a robot [chuckles]. Um, and I wasn't gonna forget that, um, because it's just *very* [emphasis retained] different to any other acting I've done before.

VA: [00:49:18:01] Right.

P3: [00:49:19:04] And, um, so therefore, like, and when the sound came in, I knew, I was like okay I *really* [emphasis retained] need to think about how I'm feeling with this or at least, remember afterwards okay what did I do? How did I react differently? Like, was there a difference?

VA: [00:49:35:19] Right.

P3: [00:49:36:13] Um [pause], and, uh, so I-I don't think it was a problem, I think maybe obviously, I could have recalled more straight after but, I think everything that I've said is, is accurate and, and, I wouldn't add anything more, from what I remember, um, yeah.

VA: [00:49:53:11] Thank you, that concludes our interview.

P3: [00:49:57:06] No worries, thank you.

End of Recording [00:50:00:45]

Appendix C

Participant Consent Forms

Appendix C1—Participant Consent Form №1

CONSENT FORM – Actor Immersion in Virtual Production (VP)

RESEARCH TITLE: Actor Immersion in Virtual Production (VP)

I hereby provide consent to the following research institution:
/Your Full Name/

Cradle AGM Research on behalf of Breda University of applied sciences (BUas)

to use my data within the above-mentioned project.

I have been informed about the research project titled 'Actor Immersion in VP' and have been asked to contribute previously collected anonymized data with the researcher involved.

I have been fully informed about the objectives of this project and have had the opportunity to seek clarification from the researcher regarding any questions or concerns that may arise about the research and my participation.

I understand that my participation in this research is entirely voluntary, I retain the right to decline participation or to withdraw from the research at any point. My refusal to participate or withdrawal of consent will not have any negative consequences on my relationship with the parties involved.

Should I have any enquiries about the research, I may contact Viktoriya Atanasova (191756@buas.nl), the responsible researcher. Additionally, for any concerns or complaints regarding the way the research is or has been conducted, I am free to contact Joey Relouw (relouw.j@buas.nl), the supervising lecturer from Cradle AGM Research.

By signing below, I consent to the following:

- Provide data regarding my experience during a VP shoot at the XR stage located at BUas
- Having the collected data be shared with the Capstone accessors at BUas.
- Being contacted if further clarification is necessary to investigate statements present in the collected data.
- Allowing the researcher to handle the data before full anonymization to facilitate further enquiries if necessary. Any data shared to parties other than the researcher will be anonymized unless explicitly requested otherwise by the Capstone accessors.

I understand that the data collected from my participation will be used solely for the purpose of this research, securely stored, and utilised accordingly.

Signature:
10/04/2024



Date

Place

Appendix C2—Participant Consent Form №2

CONSENT FORM – Actor Immersion in Virtual Production (VP)

RESEARCH TITLE: Actor Immersion in Virtual Production (VP)

I hereby provide consent to the following research institution:
/Your Full Name/

Cradle AGM Research on behalf of Breda University of applied sciences (BUas)

to use my data within the above-mentioned project.

I have been informed about the research project titled 'Actor Immersion in VP' and have been asked to contribute previously collected anonymized data with the researcher involved.

I have been fully informed about the objectives of this project and have had the opportunity to seek clarification from the researcher regarding any questions or concerns that may arise about the research and my participation.

I understand that my participation in this research is entirely voluntary, I retain the right to decline participation or to withdraw from the research at any point. My refusal to participate or withdrawal of consent will not have any negative consequences on my relationship with the parties involved.

Should I have any enquiries about the research, I may contact Viktoriya Atanasova (191756@buas.nl), the responsible researcher. Additionally, for any concerns or complaints regarding the way the research is or has been conducted, I am free to contact Joey Relouw (relouw.j@buas.nl), the supervising lecturer from Cradle AGM Research.

By signing below, I consent to the following:

- Provide data regarding my experience during a VP shoot at the XR stage located at BUas
- Having the collected data be shared with the Capstone accessors at BUas.
- Being contacted if further clarification is necessary to investigate statements present in the collected data.
- Allowing the researcher to handle the data before full anonymization to facilitate further enquiries if necessary. Any data shared to parties other than the researcher will be anonymized unless explicitly requested otherwise by the Capstone accessors.

I understand that the data collected from my participation will be used solely for the purpose of this research, securely stored, and utilised accordingly.

Signature:



Date 05/03/24

Place Breda

Appendix C3—Participant Consent Form №3

CONSENT FORM – Actor Immersion in Virtual Production (VP)

RESEARCH TITLE: Actor Immersion in Virtual Production (VP)

I [REDACTED] hereby provide consent to the following research institution:
/Your Full Name/

Cradle AGM Research on behalf of Breda University of applied sciences (BUas)

to use my data within the above-mentioned project.

I have been informed about the research project titled 'Actor Immersion in VP' and have been asked to contribute previously collected anonymized data with the researcher involved.

I have been fully informed about the objectives of this project and have had the opportunity to seek clarification from the researcher regarding any questions or concerns that may arise about the research and my participation.

I understand that my participation in this research is entirely voluntary, I retain the right to decline participation or to withdraw from the research at any point. My refusal to participate or withdrawal of consent will not have any negative consequences on my relationship with the parties involved.

Should I have any enquiries about the research, I may contact Viktoriya Atanasova (191756@buas.nl), the responsible researcher. Additionally, for any concerns or complaints regarding the way the research is or has been conducted, I am free to contact Joey Relouw (relouw.j@buas.nl), the supervising lecturer from Cradle AGM Research.

By signing below, I consent to the following:

- Provide data regarding my experience during a VP shoot at the XR stage located at BUas
- Having the collected data be shared with the Capstone accessors at BUas.
- Being contacted if further clarification is necessary to investigate statements present in the collected data.
- Allowing the researcher to handle the data before full anonymization to facilitate further enquiries if necessary. Any data shared to parties other than the researcher will be anonymized unless explicitly requested otherwise by the Capstone accessors.

I understand that the data collected from my participation will be used solely for the purpose of this research, securely stored, and utilised accordingly.

Signature:



Date 28/02/2024 Place Breda University of Applied Sciences

Appendix D

Script Breakdown

VPSN 2024

written by

Filip Berg

Breakdown Sound Design:

Diegetic on-screen

Diegetic off-screen

Non-diegetic on-screen

Non-diegetic off-screen

11 December 2023
Third Draft

Add a sort of frequency hiss for dramatic and eerie effect.

EXT. CITY BALCONY, BENCH - NIGHT

Ambiance: Light traffic, ambulance, wind, ventilation

MARY (28) looks both ways, searching the area with her eyes. She is alone, only lit up by the city's extreme light pollution and a **street lamp nearby**.

SFX: neon sign flicker

She is **pacing** back and forth in front of a bench. Over her shoulder, lays a leather purse. Her eyes keep checking if it's still there every other second.

Mary is **talking** on the phone. She looks focused, but distressed. Controlled but at the same time alarmed that something bad will happen any minute.

SFX: Raincoat movement
umbrella movement, footsteps on concrete

MARY

Yes. Now, where are you?

ANONYMOUS PERSON

I'm almost there. Just a minute away.

MARY

Hurry, you know I'm asking for a lot of trouble, just by giving you this.

ANONYMOUS PERSON

Yes, I'm well aware, and I thank you for it. You did good.

Radio PEQ to give a distorted effect to the voice on the other line.

SFX: Glitches (as if bad reception)

Mary **sits** down.

MARY

Yeah. Well. It's hard for people to know the truth, if they can't find it.

ANONYMOUS PERSON

You're right...

MARY

So, where are you???

CUT TO:

Ambiance:
Roomtone,
ventilation,
flickering lights?
muffled traffic

A man is standing still in the shadows. It's hard to distinguish his features due to the lack of light, but we can see that he is **talking** on the phone. He is the person on the other line.

ANONYMOUS PERSON

Almost there.

MARY

I'm sitting with an umbrella.

ANONYMOUS PERSON

Umbrella? I didn't know it was raining...

Overlay previous dialogue to sound like soft murmuring or whispers.

Depends on how it's shot I guess. He might just go on with his dialogue

2.

MARY
It isn't. It's just so you know
that it's me.

ANONYMOUS PERSON
I see. You always take your
precautions. A very clever
person.

MARY
You should've been here by now.
What's going on!?

ANONYMOUS PERSON
I'm here.

Mary takes turns, looking each possible direction.

Add a woosh to
make it sound
hectic and chaotic.

MARY
What? Where?

SFX: squeaking raincoat

ANONYMOUS PERSON
Very close, don't worry.

MARY
I can't see you! Which way are
you coming from???

Ambiance: dark drone

ANONYMOUS PERSON
I said don't worry.

MARY
Where god damn it!? If you don't
stop this, I'm gonna leave right
now. I don't have time for this
shit. Other people want this
information just as much as you.

Drone intensifying

Add a laser beam sfx;
If music / riser =
crescendo with the sfx to
contrast the following line
of dialogue said in silence
before dramatic BANG.

ANONYMOUS PERSON
I'm sorry. Could you just lift
the umbrella a tiny bit so I know
it's you. I just wanna make sure.

Drone slowing, silence
before shot

Nervously, Mary starts to raise the umbrella slowly. A red
laser dot appears on her forehead.

ANONYMOUS PERSON (CONT'D)
[stepping into some light]
Not everybody needs the truth,
Mary.

If he's still in the room:
footsteps on carpet. If he's
outside: footsteps on concrete

Panic kicks in. A suppressed sniper shot can be heard, as
Mary is left with a bullet wound in her head. She drops in a
second. Life leaving her body.

FADE TO BLACK

THE END

SFX: raincoat, umbrella falling, body thud

Not sure, if we're seeing her fall on-screen
or if it fades to black before

Appendix E

Final Previs with Sound

https://edubuas-my.sharepoint.com/:v:/g/personal/191756_buas_nl/Ea1zwAMQGLFBqTy5WoyRKV0B2IlvmQWDdCTBjqtTsyHnA

Appendix F

Creative Outcome

https://edubuas-my.sharepoint.com/:v:/g/personal/191756_buas_nl/EQ6mZO-H4YNKoqODuNi02yIBDbw88PIGH_umsqmf9g8N6w