What Opportunities For Storytelling Might Near-future Technologies Offer Creatives, And How Might Personal Data Affect This?

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Abstract

A common feature of storytelling, at least when it comes to a western, and classical perspective, is that of linearity. Stories often have a single path through them that the content of the story, the Fabula, is arranged along, with this arrangement of the content of the story, the Syuzhet, often being dictated by a single authorial voice. However, a rise in technology and an audience's willingness to experience new storytelling methods has helped give rise to more experimentation, leading to the popularisation of audience-controlled linearity and interactive storytelling. There can be tension within this way of telling stories as it is commonly believed that in order to increase the interactive quality of a story you have to reduce the quality of the narrative, with some storytellers and researchers approaching narrative and interactivity as opposing forces.

I believe that, by doing this, researchers and artists are accidentally limiting the scope of the combinations of Narrative and Interactivity they consider when researching these qualities of storytelling experiences. Narrative and Interactivity are neutral and complex features that can be mediated in different ways throughout a storytelling experience to create enjoyment in an audience, one of the main aims of most stories. Perhaps the multi-faceted nature of enjoyment has made reliably researching it seem difficult, futile, or even perhaps unscientific in the past, but using Roth's (2015) battery of experimentally valid enjoyment questionnaires allows me to examine the enjoyment elicited in responses to an interactive narrative experience in an experimentally valid and appropriately detailed way. This means that I should be able to derive which quantities and qualities of interactivity and narrative create or hinder the creation of not just enjoyment in an audience, but specific facets and flavours of audience enjoyment.

In order to test this hypothesis I had to build an interactive storytelling experience that could vary its amount of Narrative or Interactivity, and it became apparent while doing this that the system that runs this, a branching narrative that presented different video clips depending on audience responses, could also be used to run the research itself, not just deliver the narrative content of the research experience. Using this system, and taking inspiration from my experience with making interactive digital theatre and using magician's crowd control techniques, such as the Equivoque Force or Barnum Statements, an automated researcher was created to help brief the participants, calibrate the audience behaviour data tracking system, and deliver quantitative and qualitative data collection procedures to the audience. This researcher felt lifelike without the use of complicated AI or machine learning by using a clever mix of simple narrative path systems and a careful

anticipation of likely participant responses. The effectiveness of this sort of automated researcher was also investigated as part of this thesis.

I found:

- Various new methodologies that have wide uses for different researchers, including the automated research assistant and a way of analysing and comparing digital theatre experiences, called a Dramatography, as well as continued evidence for the use of a Performance Led Research and Rapid Iterative Prototyping a valuable methodology for examining these sorts of creative research questions.

- In spite of the theory concerning the balance of Interactivity and Narrative, I found that a narratively rich and meaningfully interactive experience is achievable via a creative, low-resource methodology, that a minimal use of easy-to-measure audience behaviour data is required to create the feeling of meaningful interactivity and liveness, and that the type of audience behaviour data used to create that feeling didn't have a significant effect on audience enjoyment.

- That a majority of participants had positive things to say about the automated research assistant and found the experience of undergoing the research user-friendly in spite of the lack of a human researcher, meaning that a scalable and on-demand research methodology for both complex quantitative and qualitative data collection, with a recognisably human face, is possible.

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Statement of Originality

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where stated otherwise by reference or acknowledgement, the work presented is entirely my own.

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1. Introduction

The history of humanity is a history of stories. Stories are the bedrock of human culture, a way in which we have entertained, educated, and understood each other for as far back as we can tell. Whether cave paintings of hunts, religious texts, history books, myths and legends, plays, novels, film, TV, or video games, storytelling has a ubiquitous and pervasive grip on human nature. With the advent of new technology often comes new storytelling (Miller, 2014), whether adapting stories from other parts of the world now able to be travelled to, recording stories for future audiences, or telling stories to a wider audience via publishing, broadcasting, or distribution of other means, advancements in technology are often accompanied by novel stories. An increasingly common way for stories to be told in a modern global society is with Interactivity, in part due to the increasing ubiquity of digital technologies and the emerging experience-based economy across the globe. With modern and near-future advancements in entertainment technology, such as with virtual reality (VR) and augmented reality (AR), as well as advancements in other fields, such as with conversational agents in the customer service industry, the ability to tell interactive stories appropriately is becoming ever more important in our futures. This is especially the case as more of our spaces for work and leisure become immersive, moving the audience from their reality into the world of the experience, and interactive, asking them to be an active agent in order to interface with the experience and propel it forward. However, as with adapting to any new genre or medium, these spaces have their own strengths and weaknesses when compared to more linear, more analogue, and more passive audience-directed storytelling, which will require specific skills in order to make the most of this newer format. Information transfer between audience and performer is a core driver of events feeling live and present. One key opportunity that new technologies give is the capture of audience data, and understanding how this data can be leveraged to drive interaction in performances is key to the productive use of such technologies.

Stories have at least three main purposes, those of entertainment, enlightenment, and sociality, or the social bonding of an audience (Benford, 2012). Sometimes stories focus on one of these purposes, sometimes they combine multiple, but never are they without at least one of these reasons to be. Another commonly present quality of a story, at least when it comes to a western, classical, and sole authorial perspective, is that of linearity. This means that stores often have a single path through them that the content of the story, the fabula, is arranged along in a chronological and immovable order, with this arrangement of the content of the story, the syuzhet, being dictated by a single authorial voice separate to the audience experiencing the narrative. However, a rise in technology and an audience's willingness to experience new storytelling methods has helped give rise to more experimentation with linearity from an authorial perspective, with stories being told out of chronological order (non-linearly), or jumping between different story paths to tell a broader narrative (multi-linearly). This rise had also led to a popularisation of audience-controlled linearity, where the direction of the trajectory of the narrative path of the story is dictated by some behaviour generated by the audience and not solely the whims of the author. This decision-making and active agency qualities of the audience give rise to interactive storytelling.

However, there can be tension within this way of telling stories. The narrative of a story is, more often than not, decided by an author, a storyteller who might carefully craft a journey for a protagonist or series of

characters in order to entertain, enlighten, or socially bond an audience in a particular way; with authorial intent. This crafted narrative is often important to authors, but by giving control of the narrative over to an audience, it can be hard to impossible for an author to maintain authorial control over a story and the narrative experience of an audience. As a result of this, creatives can create a false binary concerning these two qualities, Narrative and Interactivity, believing that in order to increase the presence of one you have to decrease the presence of the other. However, this is more of an observation of the effect of restricted resources on the creative process, with multiple narrative paths being able to be created with equal or equivalent authorial intent but not without increased resources for the artistic process given the extra volume of artwork required for any potential audience trajectory through it to feel equivalent in quality to a familiar linear narrative with authorial intention. However, there must be some way of refining the understanding of these two qualities of a story so as to more specifically understand their relationship and find ways to lessen the resource or mental perceived burden of the creation of these ever more popular ways of telling stories. What combinations of the potential quantities and qualities of these elements of a story can be combined, and how does that affect the audience Enjoyment of that story?

Both storytellers and researchers can approach Narrative and Interactivity as opposing forces, but this is not necessarily the case. There is a large body of research, and entire genres of storytelling, centring Narrative. There is also an equivalently sufficient body of research based on Interactivity. These two research areas even overlap commonly, particularly in more recent cultural research fields such as modern ludology. In spite of this, researchers and artists can still consider these qualities as forces in opposition to one another, when they may in fact be neutral and complex features that can be mediated in different ways throughout a storytelling experience to create Enjoyment in an audience. Perhaps the multi-faceted nature of Enjoyment has made reliably researching it seem difficult, futile, or even perhaps unscientific in the past, but using Roth's (2015) battery of experimentally valid Enjoyment questionnaires allows me to examine the Enjoyment elicited in responses to an interactive narrative experience in an experimentally valid and appropriately detailed way. This means that I should be able to derive which quantities and qualities of these features of a story create or hinder the creation of not just Enjoyment in an audience, but specific facets and flavours of audience Enjoyment.

As touched upon briefly above, an increasing number of tech advancements allow for an increasing number of people to create and experience interactive stories. However, the approach to creating them is different from traditional western linear storytelling, which is by far the prevalent way in which telling stories is considered, taught, and practised in many narrative art forms. These same technological advances allow Interactivity in a variety of different ways, by collecting different types of audience behaviour data and building systems that can hopefully react meaningfully and appropriately to that data in an enjoyable way for audiences. However, although data-driven art has existed for a long time across multiple disciplines, it almost always utilises one of two types of data, be that publicly available data, such as from a census or scientific experiment, or data generated by the artist themselves. Comparatively few artworks utilise audience data in their execution. Also, some near-future technology, including anything in the realms of AR, mixed reality (MR), or extended reality (XR), require a modicum of audience data in order to work effectively. The world that the audience is occupying during the experience has to be understood so that the

digital content can be overlaid or guided to interact with it appropriately so as to create the illusion of its residency within the same space as the audience. Likewise, data from the audience has to be taken into account, such as their height and when they move, in order to counteract these movements in the headset, screen, or another device the digital content is being perceived through to further sell the illusion of its equivalent physical presence in the reality of the audience. The problem that presents is that to balance the considerations of all of these ideas in one storytelling production cycle can become an incredibly resource-heavy endeavour, with few specific guidelines or structures available on how to make enjoyable interactive storytelling experiences focused on fulfilling the classic aims of a story; to entertain, enlighten, or socially bond. Adding to this the expensive equipment and complicated learning curve for user experience (UX) design, a skill not possessed already by many storytelling creatives, positions the potentially fragile medium at risk of being besmirched by badly made stories that could negatively impact the expectations of new audiences and put them off engaging with the medium, or anything similar, in the future. The development of widely available and easy-to-follow guidelines is necessary in order to minimise the risk of something like this happening.

This thesis aims to address the previously mentioned issues. Interactive storytelling is a growing field with few accessible medium-specific structures or guidelines, and one of the prevailing theories of the relationship between Narrative and Interactivity, that is to say their opposition, is, in this researcher's opinion, inaccurate. More stories are being told using data-driven tech without an understanding of how audience data can be used in storytelling creatively without relying on novelty or ultimately meaningless interaction, as is rampant in many novel use cases of storytelling within these technologies. On the one hand, you have artists and storytellers who want to tell interactive stories using these new technologies but who don't know how to best utilise the features of the interactive digital medium to achieve their authorial intent outside of a linear narrative. On the other hand, you have developers who have a full knowledge of the qualities and abilities of the medium, but who can lack the refined and developed narrative skills or audience knowledge in order to make full long-term, sustainable, artistic use of the technology they have developed or refined for entertainment purposes.

Based on my work as a professional theatre maker and performer, my initial hypotheses were:

A. In spite of the prevailing theory concerning the balance of Interactivity and Narrative, that a narratively rich and meaningfully interactive experience is achievable via a creative, low-resource methodology.
B. With my work as a stage magician, I was aware that what is required for audience members to believe a complex interaction is occurring maybe actually require significantly less complex underlying mechanisms. I hypothesised that, by using a minimal amount of easy to measure Audience Behaviour data, I could create the feeling of meaningful Interactivity, and that this data can drive a simple interaction system without the need for complicated machine learning or AI, allowing for a low barrier to entry for storytellers regardless of their technological literacy.
C. That these two methods of interactive storytelling can be combined to create a convincing AR/MR/XR experience that feels not only enjoyable to a wide range of audiences, but can convincingly replicate the

feeling of Liveness (defined in Section 3.1.) crucial for creating the illusion that this technology strives for.

This thesis addresses this research gap in the following ways:

1) Presenting a set of guidelines to allow creative users to understand key qualities of Interactivity and Narrative and how these can be used to achieve particular artistic aims.
2) Presenting an understanding of how Audience Behaviour data can be used to drive such interactive experiences and how that affects audience Enjoyment.
3) Demonstrating a low-technology, low-resource method of interactive experience design which allows artists to create a believable digital facsimile of physical presence without requiring highly technical development.
4) In addition to using the proposed design for performances, I use a version of it as an `automated researcher` to perform interviews and qualitative data capture during my study.

Throughout this thesis, I'll undergo a series of theoretical and research steps in order to answer my research questions. I'll outline a number of ways to analyse interactive storytelling and digital theatre, then apply these analysis techniques to the back catalogue of my work as Artistic Director of Nottingham-based theatre company Chronic Insanity to refine these analyses while creating a dramatography of a body of digital and hybrid theatre work. This will give me the tools to later analyse my research experience thoroughly and from a number of different angles. I'll detail the design process of an experimental interactive storytelling experience that can be used to both tell a multi-linear story that feels meaningfully interactive to an audience and to answer my research questions about ways in which this medium can create enjoyable stories using variable combinations of Interactivity and Narrative. I'll then report on a series of studies examining participants' exposure to varieties of the experience to answer my research questions, before both analysing the results of these studies independently and in comparison with each other. I'll then use these analyses to build guidelines and recommendations for researchers and artists/storytellers moving forwards with interactive or narrative technology.

Methodologically speaking, I'll use an adapted Solomon Four Group Design (described by Allen, 2017) to test a sample of experience participants on multiple runs through the research experience, a necessity given the multi-linear experience design and importance of repetition in the authorial intent. I'll measure their Enjoyment each time using a battery of questionnaires (Roth, 2015), followed up by a semi-structured interview based on their answers to gather further detailed data on any potentially significant responses from these questions in real-time. I also built an automated research assistant to help administer the study using the same system I built the interactive storytelling experience with, which will allow for a consistent experimental approach, as well as further data collection and analysis concerning how people react to another style of automated interactive experience.

Through this work, I create an experimentally verifiable series of guidelines for creatives to use in all their dealings with interactive narrative systems, whether those be from a research or artistic perspective.

However, I need to make sure that these guidelines are useful for both of these groups of potential users, so my research has been influenced by a plethora of previous research and practice in the areas of Narrative structure and linearity, Interactivity, digital storytelling, and data-driven artwork. In the next chapter, I explore these realms in order to ascertain the gaps in previous research and practice that need filling to show that my research will usefully and necessarily fill these gaps in the most efficient and effective manner.

2. Literature Review

In this chapter I will review the literature around my research, splitting it up into three main sections; Storytelling, Digital Storytelling, and Storytelling and Personal Data. In the Storytelling section, I will define several key concepts and look at an overview of the history of storytelling. I identify two key concepts from this history, Narrative linearity and Interactivity, and look at these in more detail, before focusing further upon the relationship between Narrative and Interactivity. From this, I'll posit that it's not Narrative and Interactivity that need balancing, as some creatives and researchers believe, but instead some combined function of the two that needs balancing with audience Enjoyment that is important to research. I will then move on to the digital storytelling section, in which I'll give a brief overview of storytelling through digital media, including how it differs from analogue storytelling and how we'll distinguish between narrative media and games. Finally, we'll look at Storytelling using personal data from audiences. We'll look at how audiences have traditionally been put inside stories, normally without the use of data, and how when data is used in stories or other art forms it tends not to originate from the audience. I'll then talk about which forms of data could be collected from an audience both before and during an experience. I'll take away from this that audience data collection is easy to do and can be used as an effective tool for inserting the audience into a story, but this hasn't been done in a meaningful way as of yet. I'll then round up with the laying out of my research idea; creating a meaningfully interactive, narrative-driven experience, that uses data from an audience to immerse them into the world and balances Narrative and Interactivity to promote a positive audience experience, also known as audience Enjoyment.

2.1. Storytelling

In this section, I'll define several key concepts about storytelling, including its uses and key features. A brief history of storytelling will then be looked at, including key structural changes and ideas, before looking at examples of how storytellers have changed the linearity of the story, or how interactive the story is, and for what reasons. Linearity and Interactivity are discussed together and a history of Interactivity in storytelling is presented. The idea of a balance between Interactivity and Narrative is discussed, but it is resolved that this might not be the right idea to research, with a balance between a combined measure of Narrative and Interactivity and audience experience being a more informative measure of Enjoyment.

2.1.1. Definitions

A story, according to the Oxford English Dictionary, is "An account of imaginary or real people and events told for entertainment". This definition captures several important elements about stories, namely that they can be factual or fictional, and that they are often told for entertainment purposes, but it fails to fully encapsulate all the features that make stories what they are. Major omissions from this definition include the functions of a story other than entertainment, namely how stories let us learn about our world and how inherent they are to human society. Ozaeta and Graña (2018) describe how good stories are at transferring information in educational environments in an effective way, and how this method of teaching works in both conventional and special needs classrooms. Erökten (2013) goes further and shows how children learn more

through teaching that includes analogical, story-rich content than conventional methods not infused with storytelling, with more knowledge being imparted when the former is utilised. These studies, and many more like them, go to show the learning and enlightening powers of stories, allowing them to be used as a tool for information transfer rather than pure entertainment. There's no reason that a story cannot be both educational and entertaining at the same time and, although I will be focusing on mainly fictional storytelling, many of these sorts of stories still have artistic or political messages that they wish to convey to their audiences.

This isn't all stories are good for though. Benford (2012) was investigating the role of uncomfortable interactions in media and how they impacted the audience experience. He described how uncomfortable interactions could be used in various ways to mediate the entertainment, enlightenment, and sociality of a story, presenting these criteria as the three things that stories do to audiences; they entertain, enlighten, and allow for in-group association. Other theorists have presented similar criteria when describing the impact of media in general. McQuail (1987) lists, as reasons for audiences wanting to engage with media, information (or enlightenment), entertainment, personal identity, and integration/social interaction (these last two make up sociality, understanding yourself and how you fit in with others). Therefore I will be using a definition of story that follows:

Accounts of fictional or factual, people, places, or things, that entertain, enlighten and/or allow for sociality amongst their audience.

The OED definition of storytelling goes on to list "narrative" as a synonym for story. Though colloquially this might be accepted the two words have very different meanings for the purposes of this thesis. This is summarised by Cobley (2013) who outlines the two elements that make up a traditional story; the *fabula*, or raw material and content of the story (which we'll take as the story), and *syuzhet*, or the way the story material is organised (which we'll take as the narrative). It's important to define these two elements separately because various stories have varying combinations of fabula and syuzhet. Stories, where the same events the characters experience are relayed in different orders of exhibition to the audience, would have different syuzhets. Stories, where events or characters were changed while still occurring in the same exhibition order, would have different fabulas. This will become important later on when I talk about non-linearity and Interactivity within storytelling, which is essentially the malleability of the syuzhet and fabula respectively.

2.1.2. History of Storytelling

Now that we know what a story is, what it does and what can differentiate different stories, let's look at the history of storytelling. Unsurprisingly most storytelling throughout history has been analogue in nature. Miller (2014) mentions how storytelling stretches back to Palaeolithic tribes of the Pleistocene Age (sometime between 1.8 million and 11,000 years ago) and theorises storytelling developing in this era as a necessary survival tool used to communicate information about the location of food and wildlife in the environment of a group of people. Traum (2015) takes a further step back, stating how the oldest form of storytelling is one-to-one conversation, equating storytelling with all human communication. Benford (2012), amongst many others, mentions the Aristotle three act structure, the story with a beginning, middle

and end (Nisi, 2017). He also discusses how this later developed during the Renaissance into the five-act structure, best visualised by Freytag's Pyramid (Freytag, 1863) in which the story is introduced and background information necessary for the plot is given (exposition), dramatic tension rises towards a significant point in the story (rising action), a big event happens which is the turning point of the story (climax), dramatic tension drops as the outcome of the climax occurs, and finally everything is wrapped up and a line is drawn under the events, often with accompanying catharsis or tension release (dénouement). This is shown in Figure 2.1. Although based on five-act plays this structure can be altered slightly and used to describe stories in many forms of media.

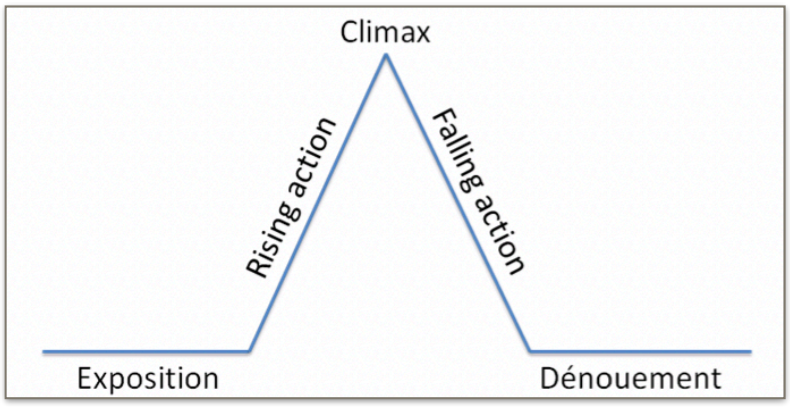

Figure 2.1.) Freytag's Pyramid, showing the general features of a five-act story (Freytag, 1863).

As technology developed storytelling finds new media through which to be expressed. Whether it's the printing press allowing for the mass production of reading materials, the radio delivering scheduled content into the home of the audience, cinema cameras capturing moving images onto film for later display, television delivering this into the home, or games consoles allowing for the first widespread consumer digital interaction with the story fabula, technological advances have historically led to advances in storytelling media. Nice (2017) describes digital technology as affecting storytelling by allowing creative tools to be cheaper, production swifter, and distribution wider amongst the population. Old ways of telling stories are not dying, but evolving to accommodate the new media that spring up as a result of technological advancement. As new technology allows for new storytelling, many storytellers start playing around more not just with the medium through which to tell their story but with the fabric of the story itself. Altering the syuzhet can allow for a new interpretation of an old story to be made, for new tensions to build, and a novel entertainment experience can be achieved with non-linearity. Allowing the audience to alter the fabula of a story can result in interesting and more powerful stories too, with Interactivity making audiences feel more a part of the world the story takes place in. Although analogue forms of non-linear and interactive stories do exist, proving that storytellers have always experimented with these elements of the story, new technology, especially of a digital nature, allows for easier experimentation with these elements. We will now look at non-linearity and Interactivity in more detail.

2.1.3. Linearity

The linearity of a story describes the order in which the fabula is delivered to the audience. Normally stories are told in a linear fashion, with events being exhibited in the order in which they occur within the timeline of the fabula, but various storytellers throughout history have experimented with non-linear story presentations. Propp (1968) looked at Russian folk tales and described how various stories shared common fabula sections. He went on to detail these different sections the stories were made up from and proposed the idea of being able to create an infinite number of stories from different combinations of the story sections. The rules for story section combination set out by Propp (referred to as Proppian morphology) were adapted by many people looking to create non-linear storytelling systems as they allow for the creation of non-linear stories that are comfortable for audiences to follow, still feel structured and are recognisably similar to more traditional linear storytelling.

Less traditional forms of storytelling also use non-linear storytelling elements. Miller (2014) discusses how various forms of media have used non-linear storytelling techniques. Sometimes the non-linearity allows for the audience or players to influence the story as it progresses, such as with experiences like live-action role-playing (LARPing) or table-top games like *Dungeons and Dragons* (D&D). These are engaged in for entertainment and the ability to affect the linearity of the story underpinning the gameplay is one of the major draws for fans of these forms of experience, although there are other benefits such as the social element of meeting up in-person to go on a fictional quest together. Other media, such as the *Choose Your Own Adventure* books, popular among children in the western world in the 80s, allowed the reader to make a series of decisions that impacted on the delivery of multiple branches of the story, including the ability to turn back at certain points and move down different narrative paths, greatly affecting the linearly of the story. Non-linearity is also present in various other books, with *The Life and Opinions of Tristram Shandy, Gentleman* by Laurence Sterne being one of the earliest examples. This nine-volume work was published over seven years starting from 1759 and contained many non-linear elements, including finding "misplaced" chapters later in the series' publication, including them out of order and starting along one story path only to suddenly change to another path to give the story "sunshine" and life. Later on, in the mid-twentieth century, William Burroughs experimented with his "cut up" works in which he reassembled previously written text into new orders, similar to an art collage or a song remix, in order to derive new meaning from the text. Other authors, such as James Joyce, would write non-linear books from scratch. In Joyce's case, with books like *Ulysses* and *Finnegan's Wake*, a full experience of the book was only possible by knowing all of the extra content that Joyce intended to be alluded to or associated with certain sections of text. He also played around with word pictures and simulating audio with written text to give more than a traditional linear experience with his stories.

Non-linearity is also present in various forms of live performance, including Luigi Pirandello's play *Six Characters in search of an Author* in which characters in an unfinished play try and find a playwright to finish their story for them. Other theatre makers install dramatic pieces in large areas, with multiple storylines occurring in different places in the venue so that audiences can't experience the entirety of a piece of work but can still get an entertaining story out of what they see being performed at any on time. These works tend to be site-specific, like *Tamara* by John Krizanc, or *Sleep No More* by Punchdrunk. These

productions allowed audiences to piece together their own narrative along whichever non-linear path they happened to travel down while moving around the venue during the performance. Of course, improvised comedy, or improv, allows audiences to experience non-linearity without as much activity on their part. Some shows build stories as they occur from audience suggestions, such as *Austentatious* or *Showstoppers!* The improvised Jane Austen story or musical respectively. Other productions allow stories to occur but be altered at specific times or by a specific member of the cast or audience, such as with *Shitfaced Shakespeare* in which a drunk performer tries to derail the sober performances of the rest of the cast, or *Improvabunga* where the audience is given buttons that can control elements of the action on stage, such as making the characters burst out into song and kiss or slap each other.

Theatre, given the immediate presence of performers and audience, allows for more interactive non-linearity than novels or film. However, the history of cinema is littered with examples of non-linear storytelling in which the screenwriter or director decides the order of the scenes, or sections of the story, in the syuzhet of the film. Multiple films have used this to great effect including the non-linear *Roshomon, Kill Bill,* and *Memento*, the multi-linear *Nashville* and *Gosford Park,* and even films that employ both, such as *Pulp Fiction.* These techniques aren't limited to film however, with theatre such as *Karagula* by Philip Ridley, *X* by Alistair McDowell and novels like *Cloud Atlas* by David Mitchel employing author-created non-linearity in their syuzhets.

These examples can be categorised into two types of non-linearity; that which is controllable by the audience or cast, and that which is pre-determined by the storyteller, essentially interactive and non-interactive non-linearity. Given that non-interactive stories don't give the creative agency to the audience, and that this element of audience experience is something I want to research, the concept of Interactivity in storytelling needs further examination.

2.1.4. Interactivity

Interactivity is a more important feature of a story than linearity. Stories with storyteller-generated non-linearity aren't as interesting an experience for the audience due to their lack of agency, and in order to have audience-generated non-linearity you need them to be able to interact in some way. Interactivity is the gatekeeper for the decisions of which path to take in a non-linear or multi-linear story. However, broader definitions still lack necessary detail in places. Crawford (2004) points out the importance of an action needing to happen between to agents, with most traditional media not listening back at the audience, therefore not allowing two-way action to occur, of which reaction doesn't count. Other definitions narrow this down to include character interaction within the interactive story medium, rather than the broader idea of general interaction. Cavazza, Charles and Mead (2004) describe the power of the user in an interactive story to change the world via character-based interactions, doing things in the world that alter the behaviour of non-playable characters that change the narrative being presented to the audience. Similar definitions are given by other researchers, Lebowitz and Klug (2011), Mitchell et al (2014), which stress the importance of character-based interaction. Ali (2017) addresses this imbalance by pointing out in other people's definitions, namely Cavazza, Charles and Mead (2002), that environmental actions can be as impactful to the story as

character interactions, and that to focus on character interactions is not only arbitrary but limiting to future Interactive Storytelling designers as fleshing out characters to the point at which they can be meaningfully interacted with is a much more arduous process than creating a meaningfully interactive environment. I agree that a definition of Interactive Storytelling should be more inclusive of these elements as well as the idea that users should be able to intentionally influence parts of the experience without impact on the environment. In real life, not every action you take causes a reaction one would think relevant or significant if one's life were a story with a narrative, so interactive storytelling systems should be able to accommodate this too. Doing so would also stop the interactions from being designed within boundaries to help facilitate the story. Also, with the potential for unimportant interactions in the interactive storytelling world, the important interactions made to affect the story matter more by comparison.

Roth (2015), when attempting to define interactive storytelling, found many differing definitions in the literature. Roth combined elements from different sources, narrative generation from Porteous et al (2010), and entertainment-based from Spierling (2005), to create the overarching definition that interactive storytelling was "computer-based interactive entertainment media that allowed users to intentionally influence a non-linear narrative, mediated by a storytelling engine". This definition focuses on interactive storytelling being used for entertainment applications, Roth basing the definition on entertainment theory (Zillmann and Vorderer, 2000; which uses gratification theory, Blumer and Katz, 1974). However, I find this definition overly insular as it only focuses on entertainment applications of interactive storytelling and doesn't take into account the other uses of media as laid out by Benford (2012) or McQuail (1987); enlightenment and sociality. Interactive storytelling has been used in non-entertainment environments to great effect, including education (Molnar, 2018; Flórez Aristizábal et al, 2017), health services (Hargood et al, 2017; Heilemann et al, 2017), and as a community support tool (Monteiro et al, 2017; Weibert et al, 2017). A more all-encompassing definition of interactive storytelling should include these non-entertainment uses.

In response to these ideas, I propose a working definition of interactive storytelling for this thesis, based on Roth's but with some small changes to make it more inclusive. Interactive storytelling is:

Computer-based interactive entertainment media that allows users to intentionally influence a non-linear narrative and its environment, mediated by a storytelling engine, with the aim to entertain, enlighten, and/or facilitate sociality.

There are elements from traditional storytelling theory that we can apply to interactive storytelling. Laurel (1991) draws parallels between theatre productions and interactive digital narratives, using principles based on those in Aristotle's *Poetics*. Using these principles is popular amongst interactive storytelling researchers, often adding in other ideas for their own uses but accepting the general ideas and structures from *Poetics.* For example, Mateas (2001) changed how *Poetics* was used to include more ideas about audience agency, but still used the ancient work as a basis for interactive story creation. However, some researchers disagree with this foundational use of Aristotle's work. Jennings (1996) argues that *Poetics* works best for communicating ideas briefly and conveniently in a linear context, but isn't the best basis for interactive storytelling theory. Jennings suggests using interactive storytelling systems based more on African oral storytelling, which

shares more innate similarities with the non-linearity and Interactivity often seen in Interactive Storytelling. Other researchers agree with this arguement, including Harrell (2007) who applied African oral storytelling as a foundation for an interactive poetry system, *GRIOT*, with success.

However, no Interactive Storytelling system is perfect, and more can be done to be inclusive for audiences. Park (2017) details how the call-and-response method, used in live storytelling, allows for effective audience interaction, especially with those audience members with special needs, who find this method of storytelling a lot more engaging and enjoyable. Also, Traum (2015) highlights how the Interactivity present in a one-on-one conversation is eluded to in both analogue and digital storytelling, but the same level of Interactivity as a real-life conversation is still missing from both storytelling forms. If more technologically advanced Interactive Storytelling systems were able to handle more varied input from audiences and respond in a more tailored way this would elevate Interactive Storytelling to another level of enjoyability and accessibility for more audiences.

2.1.5. History of Interactive Storytelling

Interactive Storytelling is not a new idea by any means, with various examples of interactive analogue stories, including interactive novels, theatre and other audience experiences, detailed in the previous sections of this chapter. However, with technological advancements over the last few decades, various forms of interactive storytelling have developed. Lebowitz and Klug (2011) talk about how many forms of interactive storytelling are impossible to reproduce in other media and Crawford (2004) explains how interactive storytelling started being recognised as its own field in the late 80s, with further investigation throughout the 90s, and finally becoming more widespread a medium from 2010 onwards. Koenitz et al (2015) go into more detail and outline the evolution of interactive stories and digital narratives along three pathways. The first evolution pathway consists of text-based examples of interactive storytelling. The first interactive text-based experience was called *Eliza* and was created by Joseph Weizenbaum in 1964 to attempt to mimic a human conversation partner using a computer program. The technology of responding to text input from a player or audience member developed further and eventually commercially released interactive fiction games started becoming more commonplace in the late 1970s and 80s, such as *Adventureland* and *Zork 1*. This trend continued, with multiple games based on famous properties, such as *The Hitchhikers Guide To The Galaxy*, being released in this time, and the medium developing into Hypertext Fiction in the early 1990s. Hypertext Fiction existed before the world wide web, but became more commonplace once more people started being connected to it. *Delirium* was the first serialised novel available on the internet, released in 1994, and allowed navigation between four different story strands, and *Sunshine 69* was the first fully interactive hypertext experience on the internet, allowing audiences to navigate different maps, non-linear chapters, and see the world through the eyes of various different characters. The medium started to fall out of fashion soon after this time, but was brought back into vogue by the development of the *Versu* platform in 2013, allowing a new generation of audiences access to interactive text-based stories.
The second evolutionary pathway is that of cinematic and performative Interactive Storytelling. This medium has audio and video elements reminiscent of certain aspects of cinema and performance. In 1967, Raduz

Cincera presented the *Kinoautomat* at the Montreal World Fair. This showed a film called *One Man and His World*, which was paused at several places and, based on various decisions made by the audience, had different next section of film shown, with different projectors being cued by a projectionist. It wasn't until laser disc technology was invented that interactive media like this were able to be automated. *Aspen Movie Map* (1978) was a program developed at MIT which allowed the audience to explore the town of Aspen in Colorado through a video feed from a car driving through the area, including accessing information about the places being driven past by clicking on them. More widespread applications of this presentation medium include the 1991 TV broadcast *Murderous Decisions* in which the same crime story was presented across two different channels, each one showing the story from a different characters' perspective. Various other experiences have used this approach since, including *D-dag* (2000) which was the story of a bank heist on new years eve spread out over a total of seven TV channels. More recently, *Lucid Possessions* by Toni Dove (2013) combined actors, musicians, robots, computer hardware and live motion tracking to create a live performance in which the performer triggers and controls media content through differently performed gestures.

Finally, the third evolution pathway features all that is ludic in nature, including video games and experimental play experiences with complex narrative design. Beginning with the invention of tabletop RPGs in the 60s, and their popularity explosion in the 80s, as well as other board games with similarly complex narrative systems within which players and audiences could meaningfully interact with the story and multiple characters, controlled by a combination of the rule book and game master, a nominated player who controls the non-playable action in the story. Once digital technology became more advanced and home entertainment systems more commonplace, as with the text-based evolutionary pathway, more video game examples of interactive storytelling began to be created. Early examples include the *Monkey Island* series of games in which the player tries to become a notorious pirate on or around the island through the solving of a series of interactive puzzles and various interactions with non-playable characters, along a rich narrative. Nowadays many games have these sorts of narrative-rich designs that place them amongst the interactive storytelling programs in this pathway. Game design studio Quantic Dream has released various games over the last decade, including *Fahrenheit* (2005), *Heavy Rain* (2010) and *Detroit: Become Human* (2018). Another studio famous for utilising this style of gameplay was Telltale Games, with games often released chapter by chapter and creating titles based on properties like *Game of Thrones, The Walking Dead,* and *Guardians of the Galaxy,* as well as creating an interactive program for Netflix set in the *Minecraft* universe. Netflix has since created a whole host of interactive experiences on its platform, most notably *Black Mirror: Bandersnatch* (2018), in which the audience can control the actions of a character trying to adapt a fantasy gamecock into a video game in the 1980s, but also other experiences linked to various entertainment properties, including *The Unbreakable Kimmy Schmidt* and *Bear Grylls: Man vs Wild*. Many independent developers are also finding success in infusing their games with more experimental forms of narrative structure, often creating works that break the fourth wall, creating seemingly self-aware and metafictional games that start addressing the player directly rather than their character to ramp up the tension in the story. Games that do this include *Undertale* (2015) and *Doki Doki Literature Club!* (2017) both receiving substantial critical praise. A particularly important interactive storytelling experience, as pointed out by Roth (2015), is *Facade* (Mateas and Stern, 2003). *Facade* is an interactive fiction experience in which a player has

an active role in a three-person conversation with an arguing couple, giving the player the option to chip into the conversation at any point and allowing them to try and get the couple to reconcile, drive them further apart, or get kicked out of their apartment altogether.

2.1.6. Balancing Narrative and Interactivity

Reyes (2017) investigated interactive VR experiences to define the most important characteristics of an experience. They found that storytelling (Narrative), Interactivity, and aesthetics were the most important characteristics of how well-received VR interactive stories were. Since aesthetics will vary drastically given the medium of delivery, including being practically non-existent for some forms of oral storytelling, it's fair to say that, the most important characteristics of any interactive storytelling experience are the storytelling itself, or Narrative, and the Interactivity. This is interesting because, historically, Interactivity and Narrative have struggled to co-exist in interactive stories. What creators often find is, in order to increase the meaningful interactions audiences can make within the story, control over the way the narrative is delivered, or even the content of the narrative itself, has to be sacrificed. Creators are often uncomfortable when relinquishing control over the fabula and syuzhet, or will try and make every story outcome equally narratively appealing, which takes a huge amount of time, effort, and resources compared to more linear forms of storytelling. Storytellers want the audience to have agency but they also want the story to have structure and they can find it difficult to achieve both these goals, at the same time, within a single experience.

Within the field of ludology, many researchers have discussed this balance between Narrative and Interactivity. Koenitz (2015) describes how the field of ludology began by asserting a clear difference between Narrative and Interactivity, making each one an exclusive idea and saying that the two couldn't both be fully recognised in a single piece of media. This is now thought to be a rather extreme stance which has since softened to be more accepting of the idea of Narrative and Interactivity being able to be blended together in certain circumstances. Ryan (2006) argues for the coexistence of Narrative and Interactivity even further, suggesting the reinterpretation of Narrative as a cognitive construct rather than a feature of the experience itself. This construct can then be applied to a number of different types of experience or media artefact, regardless of their other characteristics, including Interactivity, presentation media, and linearity.

Even with this theory, many creators feel a balance exists between Narrative and Interactivity. In practice, finding this balance is still very tricky. Shilkrot et al (2014) explain how most experiences that contain both Narrative and Interactivity tend to either be mainly narrative-driven with surface and meaningless interactions affecting the plot in minor ways, if at all, or are more interactive but with less narrative and more of an exploratory feel to them, where the audience can explore an environment but no specifically driven story can be followed within it. There have been attempts to correct this perceived imbalance and gap in the middle of the continuum of experiences (from fully interactive but without narrative, to fully narrative-driven without interaction). Multiple researchers (Macintyre et al, 2001; Moreno et al, 2001; Mateas and Stern, 2003) tried to resolve these issues by implementing cul-de-sacs, where the audience has to retrace their steps back to a different narrative path, and story "beats" that could be procedurally generated into the order

necessary to continue a structured narrative and that still reflected the behaviour of the audience and gave them agency within the story world. However, using story beats can be problematic, with modern AAA video games, like the *Fallout* or *Skyrim* series, often criticised for creating repetitive story elements and feeling unsatisfying to experience. Malaka et al (2004) used a model based on Proppian morphology in order to construct a story-arc generator for their GEIST system, used for scalable stage-based interactive AR applications. Nevertheless, applications like these, especially Moreno et al (2001) still limit audience input and system output to specific dimensions. Moreno also directed and cued the audience in the hopes that they followed the path of the intended story while still technically giving them the freedom to explore. Users had their movement guided using physical objects and were cued where to look in order to experience the intended story elements using techniques such as having other characters look somewhere in the story environment or through the use of theatrical lighting techniques to help guide attention by highlighting the important parts of a scene. Techniques like this have been continually implemented in further research, such as Macintyre et al's (2003) *Three Angry Men* AR experience in which an abridged version of the story of *Twelve Angry Men* is played out and the audience can watch the discussion between the jurors unfold from the points of view of three of the jurors involved, with each perspective reflecting the biases and prejudices of that character. The audience's point of view was changed by them physically getting out of their chair and occupying the chair of another virtual character. However, this experience is still linear and although the way the experience is delivered is interactive, with viewpoints of the action being able to be changed and different viewpoints creating different experiences for different audience members, this interaction is still not meaningful and the core story remains the same for every audience.

With the advancement of technology over the last few years, particularly artificial intelligence (AI), recent Interactive Storytelling systems are varied in how they create stories and respond to Interactivity. Those using AI-generated story elements are the most robust. These systems don't use pre-defined branching points but react to the audience input and create further story points to be experienced by them. Due to this they normally use generated 2D or 3D graphics (Mateas 2002; Cavazza et al, 2004; Pizzi and Cavazza, 2007; Ciarlini, 2005) in order to represent the characters and environments of the story. Nandi and Marichal (2002) developed a hierarchical task network that could be used to generate story sections and deliver them in an order which made sense, and Cavazza et al 2004 adapted this method and used it to tell stories in AR, which allowed multi-model interaction that was meaningful and responded to. However, as a compromise, there was a baseline plot which essentially ring-fenced the story and limited the narrative freedom of the audience.

Some people have experimented with, and proposed, creating films with interactive plots, rather than using digitally generated imagery (Ursu et al, 2008; Porteous et al, 2010; Piacenza et al, 2011). However, these systems tend to use pre-determined branching and not procedural story generation due to the need to have pre-recorded footage. Soares de Lima et al (2017) used a video compositing algorithm which assembled elements of video footage shot in order to create a library of multi-purpose video and audio that could be assembled into different combinations in response to the interaction of the audience with the narrative. They admit that a branching narrative allows for a better aesthetic but also creates a lack of story diversity and authoring complexity. They also highlight how there are, at the time of publishing, no proposals for non-branching interactive films in the literature. There are current limitations of Interactive Storytelling in film,

including genre appropriateness and mode of interaction, but Soares de Lima is of the opinion that these can be overcome.

Of course, this issue isn't related to any one genre or medium, but a seemingly more intrinsic issue with the ways stories have been told in the past. Bruckman (1990) points out how a story is traditionally linear but non-linearity is essential for meaningful Interactivity. Louchart and Aylett (2004) defined this contradiction as the "Narrative Paradox", that a compromise must be met between the story needing a narrative structure and the audience becoming an active agent through Interactivity. To respond to this they proposed "Emergent Narrative" a new approach to narrative within virtual spaces that depends on a dynamic shaping of a story rather than a pre-determined plot. This would be done by presenting the audience with a limited set of action in relation to the story at any point within it and allowing the action they'd decide upon to fully influence the story moving forward and alter the actions the audience can choose to enact later in the story. This allows the participants to influence how the story progresses in a much freer way, but still uses a limited number of interactions to keep the story within a certain area. The story can change a lot more than in other interactive storytelling systems but is still ring-fenced into a certain area. Fröhlich et al (2001) identify the problem a lot for these systems suffer from, which is knowledge that audiences that enjoy interactive stories want freedom of choice but creators want to impose a plot and characterisation on the audience. Interactive Storytelling draws people in with the promise of control but most creators aren't willing to transfer as much control to the audience as the audience might want. This is echoed by Roth (2015) who emphasises the importance of finding the balance between player freedom and guiding the player through the narrative, but this still focuses on there being a "correct" narrative that the player should seek out in order to "correctly" experience the interactive story. I agree that this is easier to implement but disagree with the idea that a creator is always "correct" and that an audience can't decide how to "correctly" experience something against the wishes of a creator. Creators can intend for a specific experience of an artwork, but ultimately should accept the way in which audiences choose to consume it. There is scope within interactive storytelling to be able to do this.

It seems like the gap still exists in finding an agreed-upon "perfect balance" of Narrative and Interactivity, with many people trying to find this elusive combination that allows for audience agency without sacrificing the control of the creator. But what if this is the wrong question to ask? Technically we can have any amount of audience interaction and any amount of artist control in a single interactive story, it'll just have a large effect on the audience experience, and most people seem to not consider these possibilities when trying to address this issue. I think instead we should be asking which combinations of Narrative and Interactivity balance with positive audience experience. When considering audience experience, the difficulty in creating meaningful narratives with high interactivity, and vice versa, is only present because we presume audiences want meaningful narratives and high interactivity at the same time, when in actual fact they might not. They might be fine with one or the other, or even neither, given the large amount of media that audiences have, and continue to, consume happily with varying combinations of these traits. So many other factors will influence audience experience, like the aesthetic quality of the work (Reyes, 2017), that in presuming because audiences have shown they like Interactivity and Narrative individually they won't like something without both in, researchers have artificially limited the research to focus on finding a compromise between Interactivity and Narrative. Also, the experiences being used as evidence for these claims don't exist as perfect research objects and are often made either to predominantly focus on Narrative or Interactivity (as

described by Shilkrot et al, 2014) or are made by creatives with limited resources, time, and funds; hurdles which, if overcome via increased resources or a more creative or efficient use of those resources, might otherwise allow for both Narrative and Interactivity to be present significantly within a single experience. I propose instead that, rather than compromising between these two elements of interactive storytelling, and given that my experience will have both Interactivity and Narrative, I will investigate which combinations are possible in order to balance the sum of these elements with audience experience, with a pleasurable audience experience being equated with an enjoyable interactive storytelling experience and audience Enjoyment coming from entertainment, enlightenment, or sociality, whether intended by the creator of the experience or not.

I will produce a storytelling experience that allows me to test different combinations of Interactivity and Narrative within it, while measuring audience Enjoyment, in order to identify the combinations of these two story features that lead to the highest audience Enjoyment. There will be several prototypes across the course of my research that will help me identify which narrative is best suited to being used as a control condition against stories in which the Interactivity and Narrative complexity have been altered. Due to the number of prototypes and the need to fine-tune them, these prototype experiences will be digital media based. Also, there are a lot of interesting developments in digital storytelling at the moment and various benefits to creating a more experimental narrative-driven piece in this medium, which I'll discuss next.

2.2. Digital Storytelling

Having mainly discussed analogue storytelling in the above section, this section looks at the contributions that digital technologies, and the stories told with them, have made to storytelling as a whole. A brief overview and history of digital storytelling is looked at before the difference between digital and analogue stories are discussed and outlined. The differences between games and stories are then outlined.

2.2.1. Overview

We've talked about various types of interactive media, most of which have current digital incarnations. Miller (2014) puts digital storytelling in perspective by showing how each tech development throughout history results in a new corresponding form of digital storytelling, outlining at least 11 different areas where this has happened, including video games, online content, and mobile apps. They also point out that definitive boundaries between genres are sometimes difficult to locate with digital storytelling experiences, as most are difficult to fit into neat categories and many borrow from multiple tech developments in order to tell one story. A lot of the history of digital storytelling has been mentioned already in regards to interactive storytelling (text-based adventures, laser discs, game consoles, hypertext novels, etc). Nisi (2017) discusses how digital storytelling has developed since the 90s onwards. Reflecting on a number of case studies from the last twenty years, Nisi shows how the adoption of mobile interface technology has allowed for digital storytelling to not be relegated to purely a form of entertainment, but is now integrated into many day-to-day activities, highlighting that not using new technology to tell stories is a missed opportunity for any creator. With the further proliferation of social media in the mid-00s the opportunity to begin to tell stories in real-

time over longer timeframes arose. Though some media, like the TV show *24* or many theatre productions, had already tried telling a story in real-time it was difficult to hold an audience's attention for an extended period of time, but telling stories through social media has been an effective tool for many artists. The horror series *Marble Hornets* used YouTube and surrounding social media pages to tell the story of a boy whose friend left town in a hurry and left him the footage from a short film they were filming which, when he starts going through it, begins to show mysterious and scary events unfolding. The character says he'll upload any interesting footage he finds that explains his friend's quick departure, and footage was then uploaded at uneven intervals. Sometimes other videos were uploaded to the account which the character claims he wasn't responsible for, thickening the mystery, and various other accounts commented on videos as if they had really happened to help sell the story. This took the found-footage genre and turned it into a real-time digital storytelling experience over the course of several weeks, then stopping abruptly and restarting many months later for another season, which wouldn't have been possible to release in any traditional digital or analogue media format.

Although this story was not interactive, digital storytelling contains many examples of pre-recorded video-based dynamic narratives. Also, digital storytelling isn't limited to fictional storytelling and can be used to exhibit factual stories. *Terminal Time* (Mateas et al, 2000) was a system that produced video history documentaries depending on how the audience felt towards certain themes, using a database of video footage and taking cues from audience keywords. Bocconi (2006) created a similar documentary-producing digital storytelling system that presented video footage and annotated it with audio in order to match a user-specific argument. Traum (2015) developed a system for the interaction and presentation of a synthetic interview with a holocaust survivor, where visitors to the institution it was installed in could have a conversation with the virtual person as if he were in the room with them, basing their work on a long list of previous attempts at presenting factual digital storytelling in a way as close to a real conversation as possible (Chabot, 1990; Marinelli and Stevens, 1998; Leuski et al, 2006; Artstein, 2016). Digital storytelling has blossomed into a broad spectrum of different media formats and ways in which stories are told. Even so, it still falls in line with the above definition of storytelling. It is well documented as being entertaining, with *Marble Hornets* alone collecting over 95 million views and receiving critical praise. Though the above studies attempt to enlighten or educate, other research has shown that doing so is effective through digital storytelling. Stanley (2018) explains how digital storytelling during the learning of a second language is an effective tool, allowing the language to be learnt within a natural context. Hessler and Lambert (2017) show how digital storytelling has been used in various forms of education over the past two decades and Robin (2008) echoes that digital storytelling is very useful in education environments, but calls for more of a theoretical framework needing to be built up to make its use increasingly effective. Research also finds digital storytelling to be an effective sociality tool, with Rose (2017) recommending it for community development and social transformation and De Jager (2017) saying that using it in conjunction with art therapy practices is particularly effective in integrating marginalised groups and community building. Put all of this together and digital storytelling is a powerful and inventive storytelling tool that can do everything traditional and analogue storytelling can do, with it being able to achieve even more of the aims of the storyteller in some instances.

2.2.2. Digital vs Analogue

In fact digital and analogue storytelling differ on an intrinsic level. Miller (2014) explains how analogue information is continuous and unbroken and that digital media overcomes several limitations of these features, with it being able to be stored easily, accessed quickly and transferred across multiple devices. Murray, in her book *Hamlet on the Holodeck* (1997), lists the essential properties of digital storytelling; that it is procedural, participatory, spatial, and encyclopaedic. Digital storytelling is procedural and, through the execution of independent algorithmic rules, can simulate natural behaviours and interactions by evaluating complex cause-and-effect sequences. Digital storytelling is participatory as computers can respond to interaction from the audience in a meaningful way, creating a form of interaction the audience is more integrated into. Digital storytelling is spatial in the way that spatial metaphors can be used to exhibit information or move users around or through the experience. Digital storytelling is encyclopaedic due to its ability to organise and access a large amount of information, allowing for narratives within the medium to encompass much more detailed and broad stories. Although some analogue media can replicate some elements of digital storytelling, it is still a lot easier, and often more effective and efficient to present a story that needs these features through digital storytelling. Miller (2014) elaborates on what separates digital storytelling from analogue, while noting the borrowed features and similarities, in a 20-item long list of features of digital stories that storytellers can use. The list includes how digital storytelling can be more immersive, can include shared community experiences, can have a system of rewards and penalties, and how digital storytelling can include elements of play and gaming within a narrative. This sentiment is echoed by Thorne (2018) who says that digital storytelling allows for the creation of immersive, interactive, multimedia and multilinear narratives, whose creation has been attempted by experimental storytellers since the 60s.

All these features make creating stories that contain non-linearity and Interactivity much easier and letting them reach wider audiences. Spanoudakis (2015) discusses how digital storytelling could be used to blur the line between author and audience, a perfect feature for Interactivity, and Dow (2008) explains how interactive storytelling is pleasurable due to presence, dramatic involvement, and agency; all features the blurring of the author/audience line can improve. Nakevska et al (2017) discuss the use of AI in responding to audience interactivity, detailing notable uses (Laurel, 1986; Bates, 1992) and highlighting the uses of branching storylines (Gordon, 1999), and developing virtual agents to fill the roles of the characters in the story, whether autonomous (Aylett, 1999; Theune, 2003) or interactive (Bates, 1992; Blumberg, 1996) as ways that AI-driven digital storytelling can evolve. Branching storylines have been present throughout the history of storytelling, but virtual agents are much more prominent in video games currently than in digital storytelling. Games have also included Interactivity, and in some cases non-linearity (as is the case with sandbox games), for quite a while now. We'll now look at what the differences are between digital storytelling and games.

2.2.3. Games vs Digital Storytelling

In *The Study of Games* (Avedon & Sutton-Smith, 1971), Sutton-Smith writes:

Each person defines games in his own way - the anthropologists and folklorists in terms of historical origins; the military men, businessmen, and educators in terms of usages; the social scientists in terms of psychological and social functions. There is overwhelming evidence in all this that the meaning of games is, in part, a function of the ideas of those who think about them.

Given the wide variety of definitions for the term game, I will clarify what I mean in this thesis when I refer to a game. A game is an activity one engages in for amusement or fun, almost always with some goal-oriented aspect for the player, an active audience member, to achieve. From the above Ludology vs Narrative debate, we know that for some time ludologists considered Interactivity and Narrative to be elements that could not coexist in the same piece of media in the same instant, until researchers like Ryan (2006) found ways to mediate the conflict and reframe the way Narrative was considered. The theory is important, but in reality games are made either by building mechanics to fit a story, like in narrative-rich games such as *Heavy Rain,* or by finding a story-based justification for combining desired mechanics together, such as in earlier video games like *Super Mario*. Most games, at least, have some associated story as a wrapping that applies a setting or in-game history to explain why the action in the game is taking place. This isn't even necessarily a digital storytelling feature, with some of the oldest games, such as chess and draughts, having stories that wrap them and give context for the actions the players can take. This means that games have some form of narrative most of the time, but narratives don't need the goal-oriented user experience of games. Imagine a continuum of narrative and goal-orientedness. One end of the continuum would have entirely abstract games that are purely there to play, such as causal mobile games (like *Flappy Bird*) that require little more than a click to jump over an obstacle. The other end would have purely story-driven digital experiences without any form of goal-orientedness, such as the VR film *Dear Angelica* in which the memories someone has about their mother from their youth are painted around the audience and they watch it unfold in a passive, yet fully immersed, way. In fact, this is just one example of a digital story that shares no features with games. There is a large market now for interactive AR storybooks, in which additional information about the story in the book can be added to the pages by looking at them through the camera and supporting app on a smartphone. Products like this have been commonplace since 2008, with prototypes in the literature existing since *MagicBook* (Billinghurst, 2001). As more technology is used to tell stories, more stories will borrow elements from games (as suggested by Miller, 2014) to help them do this in new and interesting ways, blurring the boundary between narrative and game even further and occupying more of the central space on the previously mentioned continuum. However, any form of meaningful Interactivity requires communication between an audience and an experience, which could also be thought of as a collecting and responding to audience data. Exhibiting stories in the world of the audience also requires us to know information about the audience and their world, again requiring an amount of audience personal data to accurately implement. I'll now look at how audience data has been used in storytelling experiences in the past, and what the audience data is able to be collected could tell us about an audience, allowing us to understand them and create a meaningfully interactive narrative experience for them.

2.4. Storytelling and Personal Data

This section starts off with an overview of how audiences have been traditionally included in storytelling media, often in an analogue way utilising a large amount of imagination from the audience. The idea of using personal data is brought up, and data use in other storytelling and art forms is looked into. Most data used in these media is either public, scientific data or data belonging to the artist rather than the audience, although some instances of audience personal data being used do exist. However, these uses tend to be for either novelty or for education about personal data and don't meaningfully affect the narrative of the experience. The types of data, collectable from current digital storytelling display technology, such as an AR headset, and what that data either says or implies, is discussed before the suggestion of including this type of data in a meaningfully interactive storytelling experience is made.

2.4.1. Inserting Audiences into Stories

Currently, most media that tries to insert the audience into the story it is telling does so by making the audience pretend to be a character already within the story. As with non-linearity and Interactivity, placing the audience in a story is something that creators of analogue stories have attempted in a variety of different ways. Authors have written stories using second-person narratives as a way of putting audiences into stories. Trusting the audiences' imagination to do a lot of the work of immersion. This technique is used in any length of novel, from the short stories of Lorrie Moore and Junot Diaz, to longer novels like *Bright Lights, Big City* by Jay McInerney. These novels use the technique to immerse the reader in the world or allow them to be the main character in the story. Sometimes they use the technique for other reasons, such as in *Bright Lights, Big City* where the narrator uses the second-person voice to observe their life from a distance to keep away from a trauma that slowly reveals itself throughout the story. Less traditional novels use this technique to great effect too, such as *Choose Your Own Adventure* books, which directly address the reader with the intention that they feel a part of the story. Authors like Steve Jackson, Ian Livingstone and Charlie Higson use this technique in conjunction with the interactive elements to make the actions in the story feel like they have more importance, thereby making the reader's experience more engaging. Live performances, especially those that break the fourth wall and reference the audience's existence, will also sometimes directly address or use audience members in the shows. This is particularly prevalent in fringe and experimental theatre but more traditional shows, such as *One Man, Two Guvnors* by Richard Bean, still use this technique. This approach also allows for multiple people to be part of the story, whereas most traditional or analogue media only allows for the inclusion of a single audience member at a time. Found footage films, such as *The Blair Witch Project* or *Paranormal Activity*, present themselves as stories that have happened in the same world as the audience, therefore presenting the horror in the story as a real-world possibility to the audience and making them feel like a potential part of the story, but in a different, more passive way.

Digital storytelling, particularly video games, contains a lot of opportunities for audiences to directly control characters and act on behalf of them. VR games take this even further by making the visual field of the player the same as that of the character, with fewer real-world distractions taking away from the audience experience of being the character in the game. More immersive game media, such as VR, tend to put you in

the shoes of the characters more often. Most media that wants to put the user into the story attempts to do so by immersing them into another world, often fictional and entirely different from their own, rather than trying to put the audience as they are into the story. This is obviously a lot more difficult to do as, in order to learn about the audience, you'd need to record data about them and analogue media, and even most digital media, doesn't have a current way of automatically doing this. Some forms of media have relied on self-report measures to allow audiences to include themselves in the world of the story. There are RPG systems that allow you to play as yourself, such as *End of the World* and *Savage Worlds*, where at the character-building stage before play begins players try and represent themselves as faithfully as they want to in order to put themselves into the story of the game. There are also books that parents can personalise characters within with their children's attributes, such as naming the main character after the intended reader, in order to make their children feel more part of the story, but this is presented more as a novelty rather than a serious attempt to make the child feel part of the narrative. Most media hasn't tried to put readers, as they are, into the story that often, but this is most likely due to a lack of the ability to do this rather than a lack of desire to. Fortunately, there are more opportunities nowadays to include audiences in stories, namely due to the increased amount of data we are able to collect and infer from people during their day-to-day activities.

2.4.2. Using Data in Art and Storytelling

Some forms of media, those less interested in telling a traditional story, have creators who have used data for a while now, particularly fine art. So much so that Freeman (2017) proposed a concise taxonomy for categorising data-driven artworks that can be used to more easily differentiate and describe by artists, curators, critics and consumers/audiences. Urist (2015) reviews the use of data in artwork and finds that most pieces fall within two categories. Category one uses scientific, factual, or publicly available data to create artwork. Examples include *Million Dollar Blocks* which was created by the Spatial Information Design Lab at Columbia University and uses data from the US criminal justice system to show how a majority of the two million people in prisons in the US come from a small number of neighbourhoods in the largest cities. The book *Information is Beautiful* by David McCandless is full of infographics showing factual and public data presented in artistic fashions. The other category is artwork made from data collected by the artist tracking themselves. Examples of this work include *I Got Up, I Went, I Met* by On Kawara in which the artist recorded the times he got up each morning, where he went, and who he met using stamped postcards, traced journeys on maps, and photography, for a period of twelve years. Hook (2018) also references a large number of interactive documentaries that contain storytelling using different data sets. With a few exceptions in both fine art and documentary, most of the time personal data is used to tell a story or make an educational or artistic point that data belongs to the artists or documentarian, with very few forms of media using data collected from or about audiences to tell stories.

Some media experiences have tried to use audience personal data. Most instances tend to focus on using data from singular audience members, with few experiences using group audience data. Also, the data used varies greatly depending on the type of experience. Mobile games, like *Pokemon GO*, will use the location of the player to allow them to encounter different parts of the experience, even locking some in-game rewards to specific areas (like beaches, urban areas, etc) or geographical regions. The largest form of media that

audience personal data is used for is that of targeted advertising. Bozios et al (2001) detailed how set-top boxes installed alongside TVs in people's homes could be used to record the viewing habits of the household, data which could then be used for advert presentation. Haddadi et al (2011) showed how location data from people's smartphones could allow advertisers to target adverts about local businesses and services to individuals more easily. The problem with this form of personal data usage, described by Dolin et al (2018), is that most people find aspects of targeted adverts uncomfortable, including the characteristics inferred by targeted advert software about the people whose data it processes, and the accuracy of these inferences. In fact, there is a large amount of reliably inferable information that can be drawn out of easily collectable personal data about someone. Park et al (2015) showed how audience personality traits, specifically introversion and extroversion, can be inferred from data footprints left on social media sites and used to effectively target adverts to them that result in more advert engagement; clicks through to the advertised website and more purchases made than other forms of advert targeting. Researchers have been able to predict personality of users from activity on many different online spaces, including Facebook likes (Youyou, 2015), personal websites (Marcus, 2006), blogs (Yarkoni, 2010), Twitter messages (Golbeck, 2011) and Instagram pictures (Segalin, 2017). Researchers have also been able to predict more than personality traits from these forms of data. Schwartz et al (2013) showed further that what people say on social media, and how they say it, can be used to inform us about their gender, age, location and psychological characteristics. Kosinski et al (2013) showed how, using Facebook likes, their software was able to predict a large range of information about someone to various degrees of accuracy, including sexual orientation, ethnicity, religious views, political views, intelligence, happiness, substance abuse, parental separation before the age of 25, age, and gender. Chen (2014) also showed how personal values could be inferred from this same sort of data.

Software exists that allows you to predict personal information from people's social media posts and online activity, such as *Analyse Words* or *Apply Magic Sauce*. *Apply Magic Sauce* has been used for lots of marketing and education purposes. Uses for it include predicting user personality traits and suggesting jobs to apply for or hotels to book that match with their inferred wants/needs, or showing the extent that personal data can be collected and inferred about you for theatre productions (*Privacy* by James Graham) or documentaries (*Do Not Track*). For the more educational uses it is clear that media other than advertising has used audience personal data in their exhibition. Hook (2018) reviewed 43 films that used data in "a note-worthy fashion" and found most interactive media that used data used factual data about other topics that was the same for all audiences, with about 35% of experiences using data individual to the viewer and around 25% comparing audience data to that of another source. Sources of audience data included social media (used in 27.9% of examples), location (30.2%), viewing device (7%), Internet of Things (IoT) devices (2.3%) and other sources including email content or music listening habits (4.7%). Almost 60% of films looked at by Hook used data that was sourced dynamically, being drawn from a data source in the moment of presentation and not simply reported from a previous collection. The research goes on to summarise how engaging stories can be told using data and how Interactivity and personalisation adds significant value to the audience experience, but 85% of experiences were documentary, with very few uses of data for fictional storytelling, and only 7% of experiences used audience data to adapt the narrative away from a linear story or progression of information. In spite of this, there are some use of audience data for fictional storytelling. *Privacy* by James Graham used audience data in a variety of ways throughout the production. Audience

members had their Facebook photos shown on stage, including pictures of their houses and a matching price, and questions were tailored for specific audience members in an interactive speed dating section of the show using their Facebook posts and accessing their profiles using the names from the ticket booking software of the theatre. However, this was still a mainly non-interactive use of data for the majority of the audience, and meaningful interactions were absent, with responses to the questions not affecting the story in any way. *Take the Lollipop* is a short film that uses audience Facebook profile data in the story to show a stalker gathering information about an audience member and trying to locate them, including using the user's location to print out a map and drive to where they live. Though the use of personal data to build tension in the story is commendable and entertaining, the linearity of the experience isn't affected by the collected data, with blanks in the video filled in with the same sort of data from different audiences as they view it. This also fails if an audience member's Facebook security is high enough, with a "no image can be shown here" notice being shown, breaking the tension of the story. Even so, audience personal data is used effectively for novelty and education, but the data is not incorporated into part of the narrative, there's no Interactivity, and interactions aren't meaningful and don't affect the linearity.

2.4.3. Collecting Live Audience Data

The lack of Interactivity seems to be a problem with lots of traditional or analogue forms of media using audience data, but digital forms with interaction more intrinsic to its working, such as AR, might help more easily accommodate Interactivity using collected audience data, and integrate more meaningful interactions into the narratives in the media presented. In order to show a film on a screen you need to know the size of the screen and in AR it's the same with knowing the size and shape of the audience's environment to overlay digital content onto or around it. This means that AR display technology already contains a wealth of sensors for collecting information from the audience's world, such as depth, object positioning, whether anything in the world moves, etc. Most AR devices only accommodate one audience member at a time, so only the data for one audience member needs to be tracked, which is a simpler task than tracking a larger audience's data and using it to influence a story. AR devices, such as the Hololens, Magic Leap One, and even phone-based AR, already track audience data that could be used to influence a story in the following ways. Previous research exists that has explored what data from HMDs is able to be recorded. LaValle (2014) showed how the head position of the wearer of an Oculus Rift could be tracked using the sensors in the headset, which all AR HMDs possess a version of, and head position has already been shown to be a good inference of audience attention (Sheikh, 2016). Also, the Magic Leap One has the capacity to track the user's eye movements, a feature likely to become more commonplace as further AR HMDs are developed and released. This is because foveated rendering, focusing more power to render the presented image where the audience is looking and rendering less in other visual field areas, is a power-saving and processing-reducing measure. Some HMD makers, like FOVE and StarVR, have made headsets that allow for foveated rendering, allowing their HMDs to be lighter, less bulky and cheaper, three current features which might make potential owners hesitant to buy an HMD. Eye tracking has already been shown to tell us certain things about an audience member, with inferred attention (Frutos-Pascual 2015) personal preferences (Cheng & Liu, 2012), and positive and negative associations (Mele et al, 2014; Greenwald et al, 2009) feasible to be included into an adaptive narrative. The story could also adapt depending on audio responses from the audience or volume

changes caused by reflexive audience responses, such as laughing or gasping. The technology is present in HMDs to listen out for and respond to audio changes, similarly to how home assistant devices, such as the Amazon Alexa, respond to verbal cues (detailed in Porcheron et al, 2018). There is also a multitude of research looking at the emotional content that can be inferred from recordings of voices (Zhou et al, 2013) which could be useful as another information source to meaningfully affect the narrative. In conjunction with the already available tools for collecting social media data, and inferring audience attributes from it, AR display technology allows for further real-time behaviour data collection and further inferences can be made from this data too. This would be more than enough potential data to influence a meaningfully interactive non-linear fictional narrative. Another form of data that could be collected would be bio-feedback data, such as Galvanic Skin Response, which could be used to measure the audience's arousal state to influence the narrative (Negini et al, 2014). However, I will not be including biofeedback data collection in my research as it requires extra equipment to that which displays the storytelling experience and I want to focus on what data can be captured and utilised using only readily available technology already present within this technology.

Very little storytelling media uses personal data to help tell stories, even though doing so allows for Interactivity, an audience favourite storytelling technique. Therefore exploring the use of audience data in tandem with interactive storytelling makes perfect sense.

I will produce an experience that uses audience personal data, collected from before and during the exhibition of the experience, as well as inferable characteristics about my audience drawn from this data, to create a meaningfully interactive narrative. Prototypes using individual sets of collected data will be created before the most useful data for the story will be identified and incorporated into my final narratively-driven experience.

2.5. Research Questions

Question 1: What combinations of Interactivity and Narrative make enjoyable stories?

As discussed at the end of Section 2.1.6. in response to Shilkrot et al (2014), I feel that attempts to balance Narrative and Interactivity are misguided and that a more useful course of action for understanding what audiences find enjoyable in an interactive narrative experience is to directly measure audience Enjoyment in response to different combinations of Narrative and Interactivity, considering them as able to co-habit in an interactive narrative experience without infringing on the presence of the other. A storytelling experience will be produced which will allow me to vary the amount of Narrative and Interactivity presented to the audience and, from the measures of audience Enjoyment collected, investigate which of these combinations create the most enjoyable stories for audience members.

Question 2: What uses of audience behaviour data make enjoyable stories?

Most storytelling media does not use audience data, and traditionally stories have included an audience by asking them to imagine being a part of the narrative, as discussed in Section 2.4.1. This was previously necessary because most media has existed in times when gathering audience data, understanding the audience from it, and integrating that understanding into a story in a meaningful way has been very difficult. As discussed throughout Section 2.4.3., modern technology, including some consumer technology, allows these steps to be much easier, with multiple different sources of explicit and implicit information available for content creators to build into or adapt their stories around. A storytelling experience will be produced where different forms of audience data can be recorded and used to influence the stories in different ways, with audience Enjoyment being measured to identify which forms of audience behaviour data, a form of personal data, can be used by data-driven narratives to create the most enjoyable stories for those audiences.

Question 3: Can the system that is used to drive the experience be used to run the research about the experience?

I agree with Billinghurst (2015) that interactive experiences, such as AR, have not been utilised fully for storytelling, or even entertainment applications, when so much of the technology has potential for new and interesting ways to tell and receive stories. However, some of the current uses of these technologies, such as enhancing customer experiences in physical and online retail (Bonetti et al, 2018), show that interactive experiences are used effectively for a number of human-computer interaction scenarios. They can even be used to great effect not just for pure interaction, but for education and enlightenment, one of the key cornerstones of storytelling as highlighted by Benford (2012) and McQuail (1987). This is absolutely the case when considering the interactive conversation with a Holocaust survivor as described by Traum (2015). Although AI has been shown to be useful in telling these stories for both responding to interactivity (Nakevska et al, 2017) and generating story structures (Cavazza et al 2004), these systems work best with computer-generated content, so don’t easily allow for a recognisably human face, and reduce the authorial intent of a story, often key components for allowing the targeted enlightenment and lifelike human connection to occur that makes experience such as that outlined by Traum (2015) so significant. Fortunately, the system for the research experience itself contains all the necessary functions to also underpin the running of the research surrounding the experience; such as the briefing, calibration, survey administering, and qualitative data collection. I will build an automated research assistant that will handle the administrative tasks as part of the research, using pre-recorded footage of the researcher and without using complicated AI methodologies to try and allow for a recognisably human experience that could be more easily replicated by anyone wanting to operate an on-demand or remote research project. Participants will have their opinions on the automated researcher collected and analysed to examine whether this lo-fi approach to present yet automated human-computer interaction is a viable way of conducting research for future projects.

In order to answer these questions in the most full and informed way, I have to be able to understand the experience I'll be researching in a level of detail to be able to tell if any of my results might be down to specific features of that experience rather than a more general, and potentially useful, feature that could be used to form a broader guideline. To do this, I'll have to decide upon a way of analysing digital theatre

experiences, testing it out on a battery of examples in order to understand if my proposed method of analysis is effective. Given that an analysis methodology might miss certain key considerations of a digital theatre piece, I'll need to analyse a body of work already fully understand by those analysing it. Fortunately, my theatre company, Chronic Insanity, has a wide range of different digital and hybrid theatrical production that have been made over the period of 2019-2022, for which I was the lead creative team member. By analysing these, thereby creating a digital theatre dramatography, we will be able to figure out if my digital theatre analysis methodology misses any key features of these experiences that would be useful to pick up on for the purposes of my research moving forwards. The preparation of this dramatography will also allow me to explore and decide upon refinements of several key concepts before the bulk of the thesis proceeds.

3. Methodology

3.1. Introduction

To answer my research questions, I'll need several carefully developed methodological approaches for my research. Given that I'm studying audience Enjoyment, the research experience itself needs to fulfil all the requirements of a robust stimulus for our participants to respond and react to, but must also be able to be recognised as a true artistic narrative experience in order to not impact on the participant's Enjoyment of the experience. If this happened, it would stop me from being able to faithfully answer my research questions in a way that would allow my conclusions to translate to performances happening outside of an experimental setting. Once the experience has been designed, I'll need to analyse it to ensure that it functions as intended for my research purposes. This design and analysis will require a thorough understanding of relevant terms concerning the experience of the participants, which can be difficult to pin down due to the lack of agreed-upon definitions for some terms depending on the different experiences or media they are being used to describe. I'll also have to record and analyse audience Enjoyment, a potentially amorphous concept, in a reliable and experimentally valid way. However, it's not only the research experience that requires this level of scrutiny, but the delivery of that experience to the participants that will also require a necessary level of thought and consistency so as to not impact on the Enjoyment measurements required for the answering o my research questions. Finally, the ethics of the use of audience behaviour data, technically a form of personal data, and the deception inherent to the study design need to be considered.

In this chapter, I'll explain the methodologies used throughout the artefact design and research, and decide upon definitions of our key terminologies to use throughout the rest of the thesis. I'll then explain my analysis methodologies, starting with my chosen methods for analysing digital theatre, as well as how I will analyse audience Enjoyment, a key factor in answering the proposed research questions. Then I'll begin to examine the automated research assistant methodology I'm using to run the study, and any ethical implications that that, or any part of this assembly of methodologies, might bring up.

3.2. Liveness, Immersion, Presence, Embodiment

There are certain terms that are going to be very important for us to clarify before we jump into the bulk of this thesis, but perhaps the most important of these is going to be the term Liveness. Liveness is a phrase used within theatre to a great extent to mean a vast range of different qualities of a live, in-person or digital performance, and finding an agreed-upon definition is difficult. Phelan (1993) defines live performance as performance unable to be reproduced, saved, recorded, or documented. This is because, in Phelan's eyes, live performance is a representation of an event without reproduction, and once entering the economy of reproduction it becomes ontologically different from its initial live state. However, this argument from Phelan is rooted in a belief of live performance's superiority over other media. Auslander (1999) highlights and contrasts this view, drawing upon live music as well as theatre, to conclude that synthesised performance does not have an intrinsic lesser quality than its live counterpart. However, by doing this they do still distinguish between live and recorded or synthesised performance, which they label as mediatized

performance, in a way that completely ignores the potential for a mediatized performance to also feel live, a false binary still carried over from Phelan (1993). Reason (2004) identifies these sorts of issues of personal beliefs interfering with a robust definition of Liveness, and that although this is a crucial concept to theatre, Liveness is not particularly well researched or defined by academia in that area. They do not go on to propose a definition of Liveness, but wonder if another approach more informed by the broader audience's experience to a potentially live performance could be an interesting route of investigation. This aligns with Auslander (1999), who describes the first wide usage of the term "live" as a way of distinguishing between pre-recorded and live performances broadcast over early radio stations, specifically because of the amount audiences cared about this distinction. Even more recent attempts to define Liveness across various media, such as Kim (2017), propose that it is impossible to cleanly distinguish between Liveness and other related concepts, such as the digital, the mediatized, the second-hand, the recorded, and the authentic, without creating purely hypothetical binaries that don't hold up in practical scenarios. This goes to show a trend in the literature that some researchers who propose pure definitions of Liveness tend to value live performance over other media, a belief which ends up simplifying those definitions, while others with a more multimedia appreciation of the quality of Liveness either struggle to define the concept or agree that a fixed, all-encompassing definition is not really possible.

The most appropriate way of defining or quantifying Liveness for this research, given its multiple dimensions, broad application potential, and consideration of blended media outside of the boundaries of traditional theatre, is by Georgi (2014). Having agreed that no rocksteady definition exists, they propose five defining characteristics of Liveness:

1. Co-presence of performers and spectators
2. Ephemerality of the live event
3. Unpredictability or risk of imperfection
4. The possibility of interaction
5. A quality concerning the representation of reality

It is also stated that the most important characteristics are the first three, and that all five of these qualities are interconnected, with variations in one characteristic causing subsequent variations in others. However, the author then stops short of actually crafting a definition of Liveness, preferring instead to use combinations of these characteristics to refer to work further in their book.

Liveness as a complex system of characteristics is also mentioned by Evans and Rzeszewski (2020) when discussing relationships between the user, the technology, and the world of a VR experience. They use a method of breaking down Liveness into three distinct qualia; Immersion, Presence, and Embodiment. Though these terms are similar, and often confused with one another, they all relate to the positioning of the audience or user of an experience and the content of the experience in relation to one another. For example, the word "presence" traditionally means the feeling an audience has of being present in a virtual space for creators of VR (such as in Slater, 2009; Lorenz et al, 2018), but it means the impact a space or performance has on the world of the audience to theatre makers (examined further in Goodall, 2008), almost opposite

definitions depending on which field of study or medium you're using the phrase within. This could be particularly confusing given the blurring of the boundaries between these sorts of fields that discussing digital theatre could elicit. The word "immersion" can also have different meanings even with fields or media, with various researchers within the worlds of VR and video games making distinctions between Sensory, Challenge-based, or Imaginative Immersion, amongst others (Reddy, 2016), as well as Sensorial Immersion and Attentional Immersion (Laramée, quoted by Salen and Zimmerman, 2004). Sometimes there aren't even agreed-upon definitions within a field of study or medium for these terms, with Witmer & Singer (1994) laying out definitions for both Presence and Immersion in head-mounted display based systems exhibiting virtual environments, then arguing against previous definitions proposed by Slater for these same use cases (1996) when writing their own Presence questionnaire (1998). Slater (1999) then retaliated with his own argument in response to justify his initial definitions of Presence and Immersion being the most accurate and useful for describing virtual environments. With all these conflicting ideas, from both between and within fields and media, it's important that I clarify exactly what I mean when discussing Immersion, Presence, and Embodiment throughout the rest of this thesis. Using theatrical definitions of Presence (Georgi, 2014) as an anchor, given the theatrical nature of our research experience and my practice, and rotating definitions of embodiment and immersion around that point, considering the distinctions in Evans and Rzeszewski (2020) and an audience experience focused approach (Reason, 2004) we can distinctly define these three qualia in ways helpful for analysing and discussing digital theatre. To put it simply:

Immersion *is the movement of the audience from their reality into the world of the experience*

Presence *is the movement of the experience from its world into the reality of the audience*

Embodiment *is the dissolution of the boundary between the audience's reality and the experience's world*

Different art forms or media tend to specialise in these different subcategories of Liveness. Immersion is the realm of novels, films, and video games. These are often storytelling media that try and transport the audience into the world of the story, the successful result of this being called Immersion. This is almost hand in hand with the imagination of the audience and, while some live events can attempt to create a sense of Immersion, this is always more difficult than doing so by asking the audience to fully imagine themselves there, or by displaying a controlled high-quality experience through a screen rather than allowing a live in-person audience to find the seams in an immersive live event.

While theatre can sometimes aim for Immersion, it's most successful when it evokes Presence and, like dance, live music, or art exhibitions, Presence is more often than not evoked in an immediately live setting. While Immersion is an active feeling, one created with the consent and participation of an audience, Presence is a passive feeling that can be conjured in an audience unconsciously and automatically under the right circumstances.

Embodiment is perhaps the most interesting of these qualia due to its wide distribution across specific sub-genres of the previously mentioned media. Examples of Embodiment can be found in in-person

performances, such as Magic or Professional Wrestling, as well as recorded, on-demand, and digitally distributed performances, such as Found Footage Films or Political Propaganda. It also exists due to an intersection of active and passive mental processes, like a combination of Immersion and Presence, while still existing as a distinctly separate flavour of Liveness.

When comparing these three qualia to Georgi's five defining characteristics of Liveness we notice that the five defining characteristics tend to align more with ideas of Presence and Embodiment than with ideas of Immersion. This highlights the importance of the passive and unconscious feeling of Liveness in Georgi's defining characteristics. Where Immersion is tourism, making an active decision to visit the world of the story, Presence is invasion and Embodiment is recontextualisation. Presence requires no active input from the audience and is a feeling that can be evoked without effort on their part. Embodiment can almost be perceived as Presence with context of the medium's immersive tendencies. A magician creates a feeling of Embodiment rather than Presence because part of you knows that the presentation of the impossible is a trick and occurs within the laws of the audience's reality even if the method is elusive. For a child, the same presentation of magic might evoke more of a sense of Presence, or for an adult who is being conned into believing that the trick is a real event, perhaps via a psychic, medium, or faith healer, a feeling of Presence rather than Embodiment might be felt. Embodiment is a mixture of the visceral feeling of Presence with the understanding of Immersion. Therefore the three feelings can exist along a spectrum of sorts, visualised in Figure 3.1. On one end you have Immersion, on the other you have Presence, with Embodiment in the middle.

Figure 3.1.) A visual representation of the Presence-Embodiment-Immersion spectrum

To prove this distribution along a single axis of these three qualia, let's look at a specific action or behaviour and see where different media representations of this action fall along my spectrum. Let's pick a fight as behaviour that can exist in many different media that I've already discussed. Recognising the instance of a fight is biologically important as your proximity to a real-life fight might lead to you being involved in it, an event you would want to avoid or understand more about before joining in with. It is an event that attracts your attention instinctively, without your permission.

A fight described in a novel can be immersive, with the words of the author helping you to build a representation of the scene being described in your head without any real sensory stimuli. A video game grants you sensory stimuli, visuals and audio, perhaps vibration through the controller, but the characters

might be un-lifelike and fantasy-inspired, the setting or context might be as well, and they might not be great representations of real people, so a sense of Presence might not be formed yet. Watching a fight in a film could evoke more Presence, but the staging of the fight, the number of cuts, and potentially the use of noticeable body doubles or CGI can help separate this from true reality, asking the audience to help fill in the gaps. Found footage of a fight, potentially as part of some sort of Alternate Reality Game (ARG), could evoke more of a sense of Presence given it s supposed staging in the real world, while still asking for the audience to actively immerse themselves in the world of the experience, maybe my first sense of Embodiment in this paragraph. Professional Wrestling replicates rehearsed but real-life physical fights in front of an in-person audience, with potential risk and real accidents being more likely, potential real or fake blood, sounds from strikes or weapons, and a crowd reaction helping to give more potential for Presence to a situation while still asking a fictional storyline to be kept in the midst of the audience for contextual reasons, another Embodiment example. A fight in a theatrical experience can be choreographed and stylised, but can also be lifelike and visceral, creating an uncomfortable sense in an audience that a real fight is happening in front of them, allowing their subconscious to start to worry about if they get involved somehow; a Presence response. Finally, a live music gig where a fight breaks out in the crowd, or a mosh pit gets violent, or a fan is tackled by security on stage is a live event where a fight has actually happened outside of the boundaries of the performance or artwork, perfectly evoking a sense of danger, triggering a fight or flight response in an audience, all because a successful evoking of Presence.

This description of Liveness also parallels certain structure in human biology, specifically the anatomy of the brain and the way in which our nervous systems works. Simply put, the parts of the human brain can be grouped into three sections that come one after another in evolution. The midbrain controls unconscious processes, the cortex controls regular conscious behaviour, and the neocortex controls higher-level functions. The imagination required to immersive oneself into an experience is a higher function dictated by the frontal lobes of the neocortex. The visceral and unconscious reaction to an experience is controlled by the midbrain. The complexities and calculations required for Embodiment is accounted for by the cortex, linking the raw reactive perception data and the higher creative functions of the brain and computing and understanding what is happening and why. This also links into the two nervous systems that control bodily functions and behaviours. The Somatic Nervous System (SoNS) controls conscious movement of the muscles, as well as most of what we might consider the main senses of the body (sight, smell, touch, taste, hearing). The Autonomic Nervous System (ANS) controls the unconscious body activity, including breathing, heart rate, digestion, arousal, and the flight or fight response. Though some senses feed into this system at various points, the neural architecture of the body's perception is part of the SoNS. This means that not only do Immersion, a quality defined by its perception and imagination, and Presence, a more abstract and difficult-to-define instinctual quality, potentially have links to separate nervous systems, but Embodiment, the crossing over of these qualities, might be linked to the interaction between these systems as we know happens between the systems responsible for perception and automatic responses in the brain.

However, it’s clear that Liveness is a quality of the perceiver and not the artefact or experience being perceived. A horror film might feel terrifyingly present to one person but not to another and, on the other hand, a game of dungeons and dragons might feel incredibly immersive to one person and not to another. It’s

clear that there is a second important quality that factors into this which is a desire or ability to feel Immersion, Presence, or Embodiment from a specific experience or artefact. If we consider the above spectrum as an axis of the potential for an experience to create a feeling, a second perpendicular axis could be any one audience member's desire or ability to perceive the experience, visualised in Figure 3.2. On the one hand, you have people who are more or less able to detect the signals that evoke Presence. On the other hand, you have people who are more or less willing to actively engage with Immersion when offered the agency to do so. This creates a wedge-shaped Liveness space, with the Immersion-Presence scale along one axis (the length of the wedge), audience ability along another (the width of the wedge), and audience willingness along a third (the changing thickness of the wedge).

Similar ways of describing live experience have been generated before. This wedge-shaped Liveness space shares certain qualities with Pine and Gilmore's (1999) diagram detailing The Four Realms of an Experience, with its axes of Immersion-Absorption and Passive Participation-Active Participant being similar to my Immersion-Presence and willingness axes respectively. Of course, their model ignores the ability of an audience completely, focusing solely on their desire, and also focuses on absorption rather than Presence due to it being a diagram of experience rather than Liveness. Still, the similarities in the structure and framework help validate my decision to construct my Liveness space in this way.

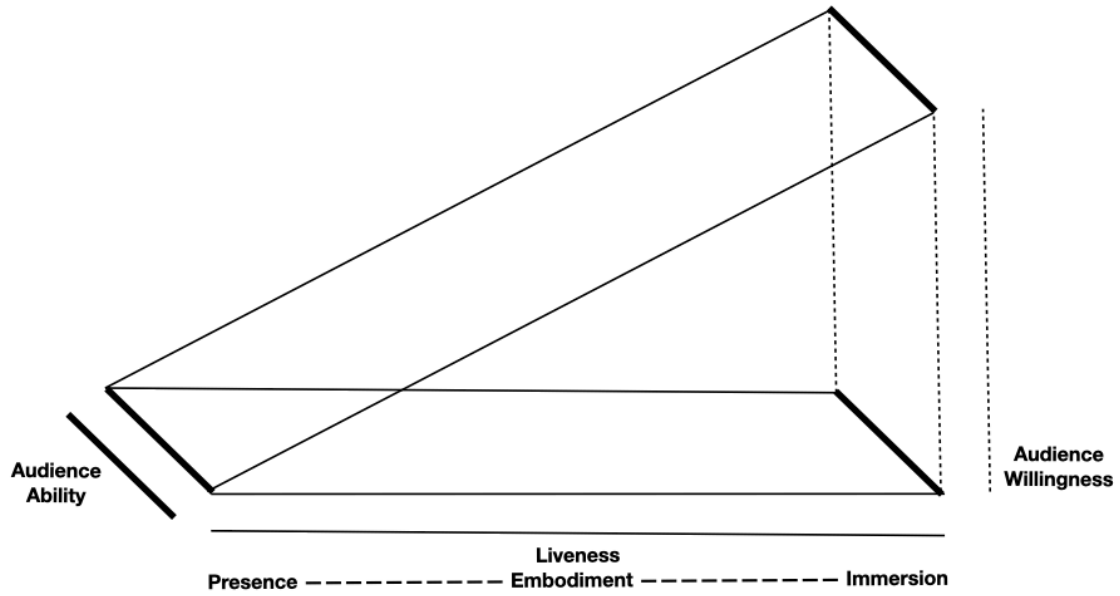

Figure 3.2.) The Liveness Wedge, a visual representation of the space within which experiences can exist in relation to their audiences

To approach Georgi's Liveness characteristics again, with this model in mind, we can consider where they might fit within this space and figure out which characteristics are the most important to Liveness overall. Returning to Figure 3.2., characteristics 1 and 4, co-presence and interaction possibility, align with the Presence end of the wedge and the audience ability to perceive that Presence. Characteristic 5, reality

representation quality, aligns with the Immersion end of the wedge, specifically the audience ability to immerse themselves and not really the audience willingness. Characteristics 2 and 3, ephemerality and imperfection predictability, don't seem to have a clear alignment on my current Liveness space. However, this might not be a bad thing. These are discriminatory Liveness characteristics that would invalidate Liveness through digital media, in spite of the overwhelming body of research looking into multiple media formats that prove otherwise, that have been discussed previously in this section and in the literature review in Chapter 2. These characteristics of Liveness are also linked to the valuing of art via scarcity, which has been a traditional way of assigning value to live productions but is much less of an applicable economic approach when considering digital performance. If these Liveness characteristics don't fit into a biologically justified spectrum of live experience then maybe they are characteristics more influenced by the culture that Georgi based their characteristics on, that of contemporary western theatre. Given the intended use of these characteristics as part of the upcoming digital theatre analysis, or dramatography, these qualities of Liveness shall be paid less attention to given the potential that they are based not on neurology and psychology but on a theatrical culture that even to this day struggles with structural inequality and elitism (Harvie, 2015); biases that our analysis of digital theatre should be able to be free from.

Given that the Immersion-Presence scale is biologically justified, and the qualities themselves are the result of the perception of the audience, then there is no reason that they can't be evoked within a digital medium that creates stimuli which evoke the same perception response in the audience. Therefore digital Liveness is equivalent to in-person Liveness, if not outright equal to it if you remove the cultural biases that make people differently familiar with digital technology. If in-person presence links into a biological ability or innate desire to attend to potential changes in our surroundings then digital presence should work in the exact same way if the audience consider a digital environment as equivalent to the physical world; a viewpoint that is only going to increase as our lives become more and more inseparable from digital and online technologies. However, Presence isn't just the feeling that something is happening, but that it is happening in a way that it might also affect you and therefore is the perception of a two-way process of information transference; the perception of an event happening or an entity behaving from an audience member and the feeling that they might also be affected by the same event or perceived by the same entity due to their physical or digital immediacy. This means that communication, the two-way transference of information, is a vital part of understanding Presence, especially via digital and online performance.

3.3. Performance-Led Research

My artistic practice is rooted in storytelling and live performance. I began as a teenager performing award-winning magic in competitions on a national level, building narratives and stories into my acts in order to create something more interesting and coherent than other magic acts, full of unconnected tricks that I saw my peers performing. I had always performed in school plays and continued to not only perform in them at university, but write, direct, produce, and design them. The rate at which I did this, and the fast-paced but low-resource environment of the student theatre world made me a more creative and efficient theatre maker and storyteller. During this time I would move out of student theatre and begin to take professional theatre productions up to the Edinburgh Festival Fringe, often based on my narratively

driven magic routines from previous competitions. I founded my own theatre company to do this in 2015, called Strickland Productions, and in 2019 I founded Chronic Insanity to begin to create more daring, lo-fi, and formally inventive work rather than the commercial work I had previously presented professionally. It is with Chronic Insanity that I began to experiment with technology in my theatre making practice, as well as audience interactivity, immersive theatre, and their coalescing feature, Liveness. I began to make work using 360-degree video and virtual reality and, when the Covid-19 pandemic hit, I was well versed in a number of digital theatre and immersive/interactive theatre techniques. I have won awards as both a theatre maker, and Chronic Insanity is a critically acclaimed theatre and digital theatre company that continues to surpass its yearly goal of performing 12 shows every 12 months.

This being a thesis very much influenced by my artistic practice of magic, live theatre, creative technology, and interactive storytelling, it makes sense to use an overarching research methodology that will allow the benefits of my artistic experience to influence the direction of the research. Fortunately there is already a robust methodological model for doing this. Benford et al (2013) present a review of performance-led research, where audiences are studied while interacting with different art media in a variety of ways. They go on to distil down the practice into three main activities that can exist in a series of nine complex relationships. The three main activities discussed are practice, theory and studies, and more detail about these, and their relationships, can be seen in Figure 3.3. The activity of studies, and its focus on understanding the experience in the wild, is important as it distinguishes between artificial lab-based research and researching experiences in the places where they would be naturally consumed, with Benford singing the benefits of the latter as a research method. A lot of the guidelines they set out, specifically iterative design methodology, capturing the artist's intent alongside the audience experience, observing audiences, and balancing artists and research interests, will be followed in order to best research and understand the audience experience of the interactive narrative product I create.

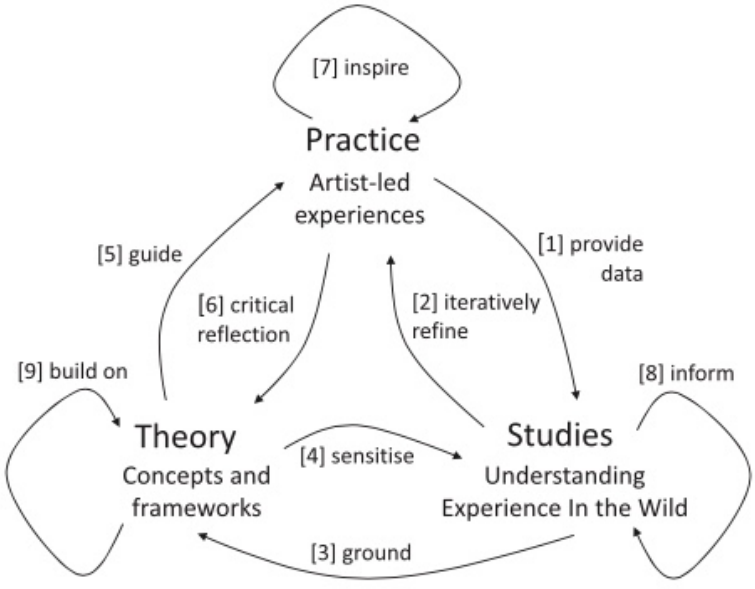

Figure 3.3.) Diagram showing the main aspects of performance-led research in the wild, as well as the relationships between each of these aspects (Benford et al, 2013).

A key guideline to highlight from Benford et al (2013) is the idea of iterative design, elaborated on in Kelley (1984). Following this methodology will allow us to rapidly design multiple rough versions of the elements of the experience to prototype them, test them, and evaluate and improve upon them quickly, over various cycles, before making a final polished version. The design of our research experience will begin as a series of separate, lo-fi, proof of concepts that can have their design processes individually interrogated and analysed to understand what will be the component parts of the research experience in more individual detail. In this case, these steps were the user experience of interacting with the content delivery system, the aesthetics of the content in the experience, and the capturing, processing, and responding to the audience behaviour data. Knowing this will allow me to more accurately identify any analysis of the overall research experience as containing interaction effects between these individual design elements. However, in order to fully analyse any of the stages, but especially the finished research experience, I'll need to clarify some important terms concerning the experience the participants might have of the research, particularly concerning the intricacies of the Liveness felt during the experience.

3.4. Methods for Analysing Digital Theatre

The research experience is going to be a digital theatre production that allows us to have participants meaningfully interact with a narrative-based experience, and be able to continue to do so multiple times without that negatively impacting on the Enjoyment measurements we take. However, in order to know that our research experience does what we want it to and doesn't create any unwanted interaction effects with our audience, we'll need to analyse it in a multifaceted way to make anticipate any effect it might have on our participants, desired or unwanted, so this can be accommodated or controlled for in the design of the participant journey through the research. Chapter 4 proposes a new way of analysing digital theatre experiences, that I'm calling a Dramatography, built out of existing and established artwork analysis techniques (such as Taylor & Andrews, 1993) as well as new techniques derived from the Liveness literature discussed in Section 3.2 above. This is based off of similar methodological ideas, such as a mediography (e.g. Beven and Green, 2018) but applying it to a theatrical, or digitally theatrical, body of work and analysing it along relevant but equivalently important directions for the emerging medium. A body of digital theatre work is then analysed to further fine-tune the analysis methodology and investigate whether it is appropriate for the analysis of a wide range of digital theatre, interactive storytelling, or other technologically focused artwork. A more detailed explanation and discussion of this methodology can be found in Chapter 4 of this thesis, which reaches the conclusion that this methodology, in spite of its novelty, fits with the specific analysis that is required to understand our research experience to the required level for our performance-led research and iterative prototyping approaches. However, while this new methodology will be sufficient for analysing my research experience, I'll require a more established and experimentally valid approach for analysing the audience's Enjoyment of the experience, or artefact.

3.5. Methods for Analysing the Artefact

In order for my research questions to be answered I need to be able to quantify when a story is or isn't enjoyable for an audience member. Not only this, but whatever method I use should benefit from a sufficient degree of detail in sub-dividing Enjoyment so as to allow me to more accurately pinpoint which feelings of Enjoyment audiences feel towards different combinations of Narrative and Interactivity. Also, the method of measuring Enjoyment should be robust, experimentally valid, and ideally based on pre-existing and thoroughly reviewed research to evidence its usefulness.

Vorderer et al (2004) present the idea that Enjoyment is at the centre of entertainment and that storytellers or makers of story systems should focus on the Enjoyment of the audience, creating suspense and curiosity, in order to effectively tell an entertaining story, or any story that they want to have an effect on their audience. These effects, be they learning, catharsis, etc, then influence future media use by altering the user prerequisites (e.g interest or empathy) and motives (e.g. mood management or escapism) of the audience. Figure 3.4. shows the model in full.

Although this model puts entertainment at the centre of the process it still allows for stories to achieve the aims, or in this case effects, mentioned by Benford et al (2012) and McQuail (1987) of entertainment, enlightenment and sociality. This means that any system of quantification of user Enjoyment could be used to fulfil my research aims if based on this underlying theory.

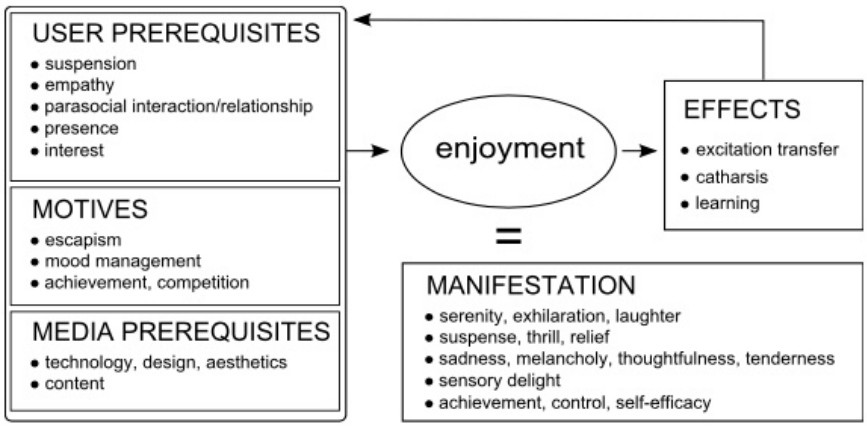

Figure 3.4.) An Enjoyment-centric storytelling system, showing examples of the causes and effects of the Enjoyment and how they affect each other (Vorderer et al, 2004).

Roth (2015) took this theory and used it to construct a series of scales that were then used to measure different elements of the audience Enjoyment of an interactive storytelling environment. 5-point Likert scales were used, ranging from "Strongly Agree" to "Strongly Disagree" and audiences were presented with statements for them to reply to. Measures collected were those of Enjoyment, Curiosity, Suspense, Aesthetic Pleasantness and Eudaimonic Appreciation, Presence, Emotional State, System Usability, and Satisfaction of User Expectations. A measure of Enjoyment was created by Roth (2015) by combining measures of three general traits (pleasance, gratifying, rewarding) with the five pairs of traits identified by Vorderer et al 2004, measuring amusement, suspense, melancholy aesthetics and achievement. This can

also be reduced down to a short scale measuring just entertainment and Enjoyment. A measure of Curiosity was adapted from the State-Trait personality Inventory (Spielberger, 1979) which measures what people felt during the media experience, such as wanting to explore the environment, being eager, or being disinterested. This can be reduced down to a short scale measuring whether audiences felt curious, interested or inquisitive. They also measured the Suspense invoked in an audience member when interacting with a storytelling environment. These could be boiled down to four measures; anxiousness to find out what happens next, worry about the story development, suspense intensity, wishing for particular story outcomes. Measurements of Aesthetic Pleasantness and Eudaimonic Appreciation were adapted from Rowold (2008) and Cupchik and Laszlo (1994) and this scale measured effects such as considering one's own situation in response to the story, and was boiled down to a short scale measuring whether the experience told audiences something about life, was inspiring, and whether it moved them like a piece of art. To measure Presence an adapted version of the spatial presence self-localisation dimension of the MEC presence questionnaire (Vorderer et al, 2004) was used. This measures how well the audience member equates the elements of the story with those of their reality. This scale can be boiled down to measuring whether audiences felt part of the story environment, whether they felt present in the environment, and how meaningful their interactions with the environment were. We will adapt this scale slightly, as my experience will be staged in the audience's environment, so statements such as "I felt part of the environment of the story" will now read "The story felt part of my environment". The measure of Emotional State (or Affect) borrows from the Positive and Negative Affect Scale (PANAS; Watson et al, 1988) which asks audiences how they feel after experiencing the story. A paired-down version of this scale asks specifically about the audience feeling excited, powerful, enthusiastic, sad, annoyed and anxious. The measure of System Usability was adapted from the System Usability Scale (SUS-3; Brooke, 1996) and measures the audience's opinion on how easy the system was to use, how most people might find it and how they found it to use. A scale concerning Satisfaction of User Expectations was also created. This scale measured user expectations towards the interactive storytelling system and was boiled down to two measures, whether the experience was better than expected or more enjoyable than expected.

Further scales are presented to measure the interaction and meaningful narrative experiences of the audience, but these are the eight scales that measure different facets of audience Enjoyment. An exploratory factor analysis conducted by Roth (2015) confirmed the external validity of these measurement scales. Roth presents these scales in both short and long form, having used both forms in different studies and creating the short forms from which measures were found to have the highest item-total correlations in order to create shorter scales which collected information that was not significantly lesser in usefulness. However, they recommend using the full scales whenever possible to not sacrifice completeness for brevity. Roth also discusses the idea of using implicit or physiological measures of audience Enjoyment, but decides that although they can overcome some of the shortcomings of self-report measures and can offer more information, such as temporal changes in measurements at different points in the story, they are often time demanding, expensive and can be difficult to interpret. Some tech advancements, such as eye tracking built into head-mounted displays, might alleviate some of these issues, but most of the collected measurements will take the form of answers to these questionnaires.

This is the perfect method of analysis that I require for my research, given that Roth's battery of questionnaires provably measures Enjoyment, divides the concept of Enjoyment that it measures into more precise sub-groups, and does so in both an experimentally valid way and by adapting previously reviewed and accepted questionnaires, combining them to create a robust battery of questionnaire items that fulfil all my research needs. I will use these scales when appropriate to measure the Enjoyment audiences feel towards my interactive narrative experience (Appendix A), measuring the variation in enjoyability between different combinations of Interactivity and Narrative and the influence of different types of audience behaviour data on the narrative path chosen by the experience. Then, using an automated research assistant, relevant follow up questions will be asked in order to collect qualitative information explaining the reasonings behind any significant instances or changes in questionnaire responses. These automated, semi-structured interviews will be the only additional data to the questionnaires collected for the purposes of my research because this analysis has been designed to be scalable. I am deliberately not collecting data that requires the in depth analysis of an individual, such as analysing the participant's facial expressions throughout the experience, although this could be a useful option for other researchers. The simplicity of this methodological approach is an important practical decision as I want to analyse what can be understood about participants from a scalable system from the get go, rather than creating a perfectly in depth analysis system that is resource intensive and impossible to reproduce at scale. Given that these will hopefully be two valuable qualities of the research experience, scalability and a lack of resource intensity, this approach compliments the practical and simple design philosophies utilised throughout this thesis.

3.6. Automated Researcher

Roth (2015) suggests pairing their questionnaire battery with additional qualitative data collection to refine your understanding of the context and interactions between the Enjoyment felt by your participants. As stated in the first line of Reñosa et al (2021), the gold standard of qualitative data collection has traditionally been in-person interactions but, as they continue to explore in their paper, these became much more difficult to mediate when conducting qualitative research remotely or in a resource-constrained setting, such as those created by the Covid-19 pandemic. However, this is not a Covid-19 specific issue, with quantitative research having a host of tools for delivering remote, scalable, and on-demand data collection (reviewed by Ali, 2021) but this not being the case for qualitative research. Reñosa et al (2021) discuss the idea of building online rapport with participants and conducting research over videoconferencing software, such as Zoom, these methods don't help address this current imbalance between the convenience of online quantitative and qualitative data collection methodologies. A qualitative methodology that can provide on-demand, scalable, and remote data collection in a replicable and automated way, like many of the online quantitative data collection programmes available to researchers, would be a valuable asset to researchers, especially if it could appear human-like, maintaining an online rapport with participants and being able to be conducted over familiar software channels like Zoom.

Our research experience is going to be delivering recordings of a human performer in an interactive way to our participants, waiting for them to respond to questions, and then moving on to the next sensible part of the

conversation. It became clear that this was also the interaction that a participant would undergo with whoever was running the research itself, and the idea was had that an automated researcher might be able to run the research for the participant, brief and debrief them, calibrate the audience behaviour capture system, administer the questionnaires and ask follow up questions depending on their responses and if they were of significant interest. I could see various interesting use cases for an automated researcher, such as scaling research, remote research, ensuring identical researcher communication to participants, or conducting international research regardless of the work hours of the hosting country. There isn't currently a clear methodology for this sort of work, but given my system will allow me to construct something that will address these issues, I'll be doing just that. The main worry for this sort of system might be if the pre-recorded researcher might create some sort of unease or frustration with the participants that could impact on whatever research is being conducted, so I'll investigate how the participants feel about the automated research assistant at the end of the study. However, this system also has its benefits, such as how it allows us to measure audience Enjoyment without breaking their immersion in the medium of the experience, something outlined by Roth (2015) as a benefit to the collection of participant Enjoyment data if possible to implement. More detail about the mechanics of the automated researcher can be found in Chapter 8, and the performance script and semi-structured qualitative questions asked by this system can be found in Appendix B and Appendix C respectively. This automated research assistant is a unique contribution from this thesis, and also clearly shows the benefit of the combination of artistic practice and research as a system this simple yet sophisticated wouldn't have been possible without the performance-led and iterative design processes undergone during the development of the research experience, nor without the understanding of the experience afforded to us by the clarification of language surrounding Liveness. However, there is an important question surrounding the ethics of using a system designed for the presentation of fictional stories, where belief can and is often suspended in anticipation of interaction, for a non-fictional interaction system, or for indeed using the same system for these two uses one after another. Also, this system is only possible given the audience behaviour data it records and interprets from the participants, which constitutes a form of personal data, but the ethics of using this personal data in this way, as well as using it for a purposefully deceptive process, were considered as part of the ethics approval process for my research (Appendix D).

3.7. Summary

Methodologically, the research in this thesis will utilise a series of different approaches for separate parts of its planning, execution, and analysis. The creation of the research experience, or artefact, will benefit from the balance of research and artistic influences present in a performance-led research methodology, especially the iterative design and prototyping methodological element that'll allow me to rapidly develop sections of the experience, then various prototypes, before a final polished version emerges. By using Roth's tried and tested questionnaire battery (2015) we can analyse Enjoyment reliably, and by utilising an original automated research assistant methodology we can make sure the questionnaire, and the study as a whole, is delivered in a reliably replicable, scalable, and remote way, without needing anything other than the system we already have to drive the narrative of the research experience, nor without creating an extenuating ethical complications for participants. The clarification of the meaning, and subcategories, of Liveness that we'll use moving forwards allow us to develop our own digital theatre-specific analysis to

produce a dramatography methodology that allows for both the broad artistic analysis of a digital theatre production while also analysing its relevant, medium-specific, fine detail. This will be explored further and a final method of conducting a dramatography will be chosen to allow me to apply it to the finished research artefact to evaluate its appropriateness as a stimulus for the research I have planned.

4. Dramatography

Given that the practical elements of this thesis will focus on the conception, creation, and evaluation of a digital theatre experience, I'll need a method by which to thoroughly analyse and understand a digital theatre experience on multiple relevant dimensions. This will allow me to ensure that my eventual research experience meets all the criteria it'll need to meet in order to be a reliable and valid stimulus for my research purposes. Given that I was unable to find an already existing methodology for doing this that was designed specifically for both digital and cultural needs, I have created my own analysis process for examining digital theatre, hereby named the dramatography. In this chapter, I'll explain the combination of novel and pre-existing methods that make up my analysis methodology, before analysing a body of digital theatre work to explore the benefits and weaknesses of using the dramatography as an analysis tool. I'll finish by reflecting on the analysis methodology and suggesting its appropriateness moving forwards for my, or any researcher or artists', cultural analysis needs.

4.1. Analysing Digital Theatre

As a result of the lockdowns imposed due to the Covid-19 pandemic, a lot of theatre organisations and freelancers have turned to the internet in order to continue creating theatre, under the new genre label of digital theatre. The reasoning for making this artwork varies from person to person and company to company. Some people started making this work as a temporary measure, waiting to move back to making in-person theatre as soon as possible. Others found a new favourite medium to create work in and will continue to create digital theatre moving forwards, lockdown or no lockdown. A lot of theatre makers will probably find hybrid ways of continuing to work in both in-person and digital performance spaces due to the economic, sustainability, and accessibility benefits of the genre. However, because of the different intentions behind the work being created, and also due to the rush of some organisations to create or present digital theatre work at the start of the pandemic, there are a lot of different types of digital theatre present. I thought it would be helpful to create some sort of framework for digital theatre categorisation that would consider how native to a digital culture space the work might be. I have come up with the following five categories of digital theatre:

1. The Recording
2. The Mindful Recording
3. The Digital Creation
4. The Mindful Digital Creation
5. The Transmedia Creation

The Recording is a digital recording of a theatre production, whether audio or video, that is shared online. These were very prevalent at the start of the pandemic as people began to release archive recordings of previous shows to online audiences, but have always existed in some shape or form, most notably as bootleg videos of Broadway and West End productions. These productions are categorised by not being directed with the potential online audience in mind. If you were performing a show on a traverse stage, with an audience

seated either side of you, it would be a mistake to only perform the show to one side of the audience, ignoring half of the people who were watching the performance, but this is essentially what happens with these digital theatre pieces. By recording these performances without time to consider the digital audience, or without intending to distribute them further in the first place, these are perhaps the least engaging digital theatre pieces, feeling more like pale imitations of in-person theatre in the eyes of many audiences.

The Mindful Recording is a step in the right direction of digital theatre, by recording an in-person theatre production in a way that considered the audience watching it after the fact, using camera techniques to focus attention and enhance the action on stage rather than just documenting that it occurred. NTLive, run by the National Theatre, is a great example of this, as is the Royal Court's production of Cypress Avenue, which mixed footage from the Royal Court production with extra filmed footage on-site in Northern Ireland to elevate the original production further, going so far as to include footage of the stage being tidied up by the stagehands at the end of the performance. Mindful Recordings, and indeed Recordings, are digital theatre in a very literal sense in that they are digital captures or records of an in-person theatre production.

The Digital Creation is a digital theatre production that has been created to be staged for a digital audience from its inception, not as an afterthought like with a Recording nor at a point in the process like with a Mindful Recording. A Digital Creation might be an adaptation of an already existing show, just presented over a digital format. This includes performances over videoconferencing applications, such as Zoom and radio or podcast plays. These productions may not necessarily be about, or recognise their staging being, online or digital in any way, but are simply theatre productions where a digital audience was considered the primary audience from the get-go. In spite of its digital staging, it might not be difficult to re-stage a Digital Creation in a physical, in-person performance space.

A Mindful Digital Creation, in the same way that a local community theatre might stage a show about the local community, might tell a story about digital technology or the internet and people's behaviour while using it. Rather than performing an already existing script over a digital medium, as with a Digital Creation, a Mindful Digital Creation would adapt that script to suit the medium, to reference and make sense of the way it was being adapted, rather than to not recognise this method of presentation. It might also be a completely new creation purely for a digital medium, that utilises the features of that software or website in the same way that a physical in-person production would the set or lighting design. Where a Digital Creation might simply present a production on a digital stage as if it were any other performance space, a Mindful Digital Creation more carefully considers the architecture and aesthetics of its digital stage to more carefully fit a production to its digital presentation space, with a production of this category being more likely to be considered as being "Born Digital", "Digitally Native". Because of this, it would be much harder to re-stage a Mindful Digital Creation in a physical or in-person performance space.

A Transmedia Creation utilises the accessibility of the internet and digital performance spaces to allow performances to take place over multiple different online spaces consecutively or simultaneously. One of the benefits of digital theatre is the accessibility of different digital spaces by a single audience member. If an in-person production wants to change setting this has to be considered in the set design carefully or, in the case

of a promenade production, the audience are physically led to another part of the performance space before the next scene begins, whereas for digital theatre this could be achieved in a much simpler way. These productions can exist as stand-alone performances that use multiple different devices or applications for the performance, such as The House Never Wins by Kill The Cat Theatre which has the performance play out over Zoom, but with supporting material distributed via WhatsApp during the performance. They can also exist as broad treasure hunts or distributed performances across multiple different websites, stretching far and wide across the internet like an ARG.

As we can see these categories of performance evolve each time, with more thought and consideration being taken between each category concerning the digital performance space that it will be staged in and the experience of the audience for the production. We can say that these categories increase in digital nativity, with each category moving along a scale of non-native to native when it comes to their fit or inception for digital performance or presentation spaces. This gives us another powerful tool for distinguishing between digital theatre and performance based on its reason for being and its authorial intention, rather than just the qualities and potentials it has when it comes to the Liveness Wedge and Georgi Liveness categories (2014, see Section 3.2.).

Another way to approach analysing digital theatre is by using the process designed by the art educator, Rod Taylor, which evaluates a visual artwork along four categories. These are detailed by Taylor (& Andrews, 1993) in the following way:

1. **Content** - What is the work's content in terms of subject matter? How significant is this? How has the artist accumulated the necessary information?
2. **Form** - What are the formal qualities of the work in terms of its visual elements: colour, shape, pattern, etc? What are the physical properties of the work, for example, its size and shape?
3. **Process** - Examine the techniques, processes, methods and time scales involved in making the work
4. **Mood** - Investigate the mood, atmosphere and feelings evoked by the work

This process allows us to methodically report on and document every element of an artwork and, without any adaptation, also works for digital theatre productions and performances. We can apply this method to a series of digital theatre productions, then continue categorising them as digital theatre artefacts and by their potential to evoke Liveness, to begin to identify trends across these different methods of categorisation.

4.2. Chronic Insanity Dramatography

Chronic Insanity has had a hand in the production of a number of digital theatre pieces between January 2020 and April 2021. We will now go through them all, examining and categorising them using the above processes, while also considering the reasons for the creative decisions taken during their creation. Some of our above digital theatre categories aren’t mentioned in this analysis, namely The Recording and The

Mindful Recording, as Chronic Insanity didn't stage any digital work over this time period in a physical space without considering the digital audience as its primary cultural target.

4.2.1. PVC: A Virtual Reality Ambush

An installation consisting of a VR short film and an appearing set, for an audience of 1-4 about how people can find themselves very suddenly in the middle of a chaotic situation. It was initially performed in the art gallery at Broadway Cinema in Nottingham in January 2020 before being transferred to the Nottingham Playhouse in February 2020. It was then revived by Offbeat Festival, run by the Oxford Playhouse, for June 2021, to be performed at the Burton-Taylor Studio. The narrative skeleton of the production was crafted by Nat Henderson and Joe Strickland and is devised and improvised over by the cast of each production.

Content - The work deals with the story of a group of rag-tag young people, living in a near-future crime ridden dystopian world. Two of the characters have turned up at a pre-agreed spot to intercept a package from The Courier for their bosses. One is more adept and serious than the other, the latter having found the job on an abandoned smartphone and definitely not trained enough to handle themselves. The Courier arrives and is revealed to be the friend of the untrained interceptor, who has become The Courier in a similarly convoluted semi-inherited way. The original recipient of the package suddenly turns up and kills the other three characters and the story ends.

Form - The VR footage is roughly 15 minutes in duration, lit however the space is naturally lit without extra lighting. The space is decorated with dust sheets and detritus, as if left derelict for a period of time. Characters wear practical and warm, but potentially ill fitting, clothing. The room the audience views the experience in is the same as the room that the piece was recorded in. The set is absent when the audience begin watching the film, and it is reassembled during the duration of the film, the VR headset acting like a blindfold so that, when the film is over, the audience takes their headset off and suddenly finds themselves in the middle of the same derelict space, evidence of the bloodshed now physically around them. The characters are directed to perform naturalistically, in a semi improvised manner around the physical set during the VR recording process.

Process - The direction of the scene moves the performers around the camera, often placing the audience in the centre of the action to force them to pick a side and focus on one character over another. This has a particular strong effect near the end of the film where the original recipient aims a gun at another character through the audience's position, allowing the audience to come face to face with the danger of the story. The script is improvised around a rehearsed skeleton and the performance filmed in a single take, usually only after a day of rehearsal. To make the set reappear for the audience once the VR experience is finished, the set is initially designed to cover a large area in as few pieces as possible so that it can be reassembled quickly and without the audience noticing during the exhibition of the footage, ready for them to suddenly find themselves surrounded by once they take the VR headset off at the experience's end.

Mood - The revelation of the set having been rebuilt around the audience evokes a very complicated sense of presence and reflection. The events of the film are those which you would want to avoid, but the knowledge that they aren't actually happening helps dissociate the audience from the threat and violence of the film. This means when they remove the headset and see the aftermath of the film around them that that barrier between the story and their reality is broken in an unusual and confusing way. When a phone then rings in the wreckage, the audience is called to action, and has to decide if they will traverse the barrier between their world and the world of the story and become an active participant rather than the passive voyeuristic audience member that they have been up to this point, and are used to being. If they answer they hear a short message telling them that they should "probably get out of there" by the last surviving character.

Digital Theatre Category - Mindful Digital Creation

Liveness Wedge Position - Immersion (VR) turns into Presence (Installation), Low ability (Media activates human instincts), Low Willingness (Passive audience experience during VR portion)

Liveness Characteristics Present - Co-presence of performers and spectators, Ephemerality of the live event, The possibility of interaction, A quality concerning the representation of reality

Liveness Characteristics Absent - Unpredictability or risk of imperfection

Figure 4.1.) A screenshot from PVC: A Virtual Reality Ambush's run at Offbeat Festival at the Oxford Playhouse in 2021, with the 360-degree video presented on a 2D plane

4.2.2. Circulation

A digital theatre short consisting of film, music, spoken word, and illustration which fantasises about the world outside the boundaries of your house. It was commissioned by the Nottingham Playhouse as part of Nottstopping Festival in May 2020. It then transferred to Upload Festival in June 2020. It was written, performed, and illustrated by Nat Henderson, with composition and direction from Joe Strickland.

Content - The short digital work consists of a short piece of unedited footage of the camera, a smartphone having been taped onto a long piece of bamboo, being hoisted precariously into the air. At a certain point the footage changes, slowing down, becoming more saturated, and triggering the start of a thrumming and comforting electronic soundtrack. As the camera is rotated on top of the makeshift selfie stick a poem that details an imagined walk around Nottingham is recited. As specific areas of the city and surrounding areas are mentioned line drawings of those areas fade in and out of the shot. Once the poem is finished the camera begins to fall out of the sky and the original unedited quality of the footage is restored.

Form - The footage is presented in a vertical format, as if to be viewed on a mobile phone screen. When the footage slows down and changes it becomes saturated, making the blue of the cloudless sky much more intense than in real life, as well as the red-brown of the bricks of the surrounding buildings and the green of the foliage. The illustrations of Nottingham locations are done in thin white lines and fade in slowly, pause to be seen, then fade out over the same amount of time. The soundtrack had a swirling background of various repetitive synth textures, which is punctuated by a slow piano melody when no poetry is being recited that dances around and returns to a root middle C note, sounding not unlike a doorbell at this point. The poetry is recited slowly and calmly, in a clear female voice. The experience lasts around seven minutes.

Process - The film was recorded and edited in a day with equipment that we had lying around the house, or could easily acquire in 24 hours. Bamboo was taped together to create a 7.5m long selfie stick that could reach over the top of the house we were filming in the garden of and film the surrounding area. The awkward footage of the setting up and taking down of the selfie stick is kept in the film to show that trying to escape a lockdown and think about returning to a normal life is awkward and difficult. The poetry was written without any specific digital audience consideration, and all other production elements (music, illustration, voice over) were created in one day without much rehearsal or refinement.

Mood - When the phone finally reaches its zenith and the selfie stick stands tall, a sudden and welcome feeling of calm is felt from the changes in speed, colour saturation and the sudden appearance of the pulsing electronic soundtrack. The poetry and motion in the footage that follows is slow and relaxing, with the soundtrack announcing the beginning of a new verse with its doorbell-like chiming of the piano. Once the phone plummets out of the sky, it feels as if the spell has been broken as the effects all stop, but the feeling that that relaxing and calm state is nearby remains, to be reentered one day soon.

Digital Theatre Category - Digital Creation

Liveness Wedge Position - Immersion (Digital Theatre), Medium ability (not automatic, no specific requirements), Low willingness (passive audience)

Liveness Characteristics Present - None

Liveness Characteristics Absent - Co-presence of performers and spectators, Ephemerality of the live event, Unpredictability or risk of imperfection, The possibility of interaction, A quality concerning the representation of reality

Figure 4.2.) A Screenshot from Circulation

4.2.3. Life_Stream

A digital theatre production about how people misuse and cause abuse using the internet. It was released online in May 2020. It was written by Joe Strickland and directed by Nat Henderson and Joe Strickland.

Content - The story of this digital production consists of four characters waiting for a red room, a live streamed snuff film, to be broadcast on the dark web. One character is a journalist, in her mid fifties and recently made redundant who now writes freelance for a trendy online news website about her perspective of online trends. Another is a Let's Player, someone who plays game sonnies for a digital audience, who increasingly betrays their alt-right way of thinking over the course of the production. The other two are a set of brothers, either side of adulthood, who are waiting up to watch the second character's stream. They all stumble across the red room and give monologues or duologues about a variety of subjects, including internet pornography, the alt-right, and the exposure of young people to violent and graphic images. The red room opens and feels like a prank for a second before recalibrating and beginning. Instead of the torture of a terrorist as promised, an innocent US citizen is tortured to death by an alt-right psychopath. Everyone leaves the stream, except the let's player, who delivers a final monologue about being groomed online. It's then

revealed that the journalist character, who has steadily become more and more immoral over the course of the production, is the mother of the two teenagers when she enters one of their rooms to bring some washing in.

Form - The footage of the performances is assembled on the screen as if being experienced in a videoconferencing app, with video feeds arranged in a grid format. The top two quarters display the journalist (top left) and let's player (top right). The bottom right corner shows vertical video from both teenage characters side by side, leaving the bottom left section black and empty, aside from a countdown that runs the duration of the performance, counting down to the revelation of the Red Room. The footage of the performers only cuts out if they turn their cameras off, which doesn't happen until the end of the production, so there are shots of empty rooms and performers using a computer but not talking to the audience throughout the production when another character is being focused on in the narrative.

Process - The performers "not performing", the long shots of characters at their computers when they aren't performing, emphasises the audience feeling of voyeurism that links the themes of the piece and draws parallel to the voyeuristic nature of a live performance. The countdown in the Red Room section of the screen creates a feeling of anticipation for the event that the whole play builds up to so that, to blur the line between the audience and the characters as they are all doing the same thing in waiting for the Red Room to begin. The events of the Red Room are then shown to the characters, but not the audience, allowing the violence and horror of the footage to be imagined much greater and personally than we could create for each individual audience member, much like the process of not showing the monster in a horror film to make them appear scarier to the audience. The script, initially intended as an in-person performance, was written over a number of months, with the production rehearsed over a fortnight, with each performance rehearsed and recorded individually along to a read through track and assembled together on screen in the edit to make sure that characters performances lined up.

Mood - The production evokes a sense of anticipation and morbid curiosity and, while waiting for the room to open, uses the captive attention of the audience to present information and evidence for malfeasant uses of the internet from ordinary people. The fake out when the room is revealed, where it initially appears to be a prank and then suddenly changes to the real room, should help to equate the feelings of the audience with the characters to bond them closer so that when they all respond to the Red Room in a different way the audience feels uncomfortable not having a clear moral protagonist during the production.

Digital Theatre Category - Digital Creation

Liveness Wedge Position - Immersion (Digital Theatre), Medium ability (not automatic, no specific requirements), Low willingness (passive audience)

Liveness Characteristics Present - Co-presence of performers and spectators, A quality concerning the representation of reality

Liveness Characteristics Absent - Ephemerality of the live event, Unpredictability or risk of imperfection, The possibility of interaction

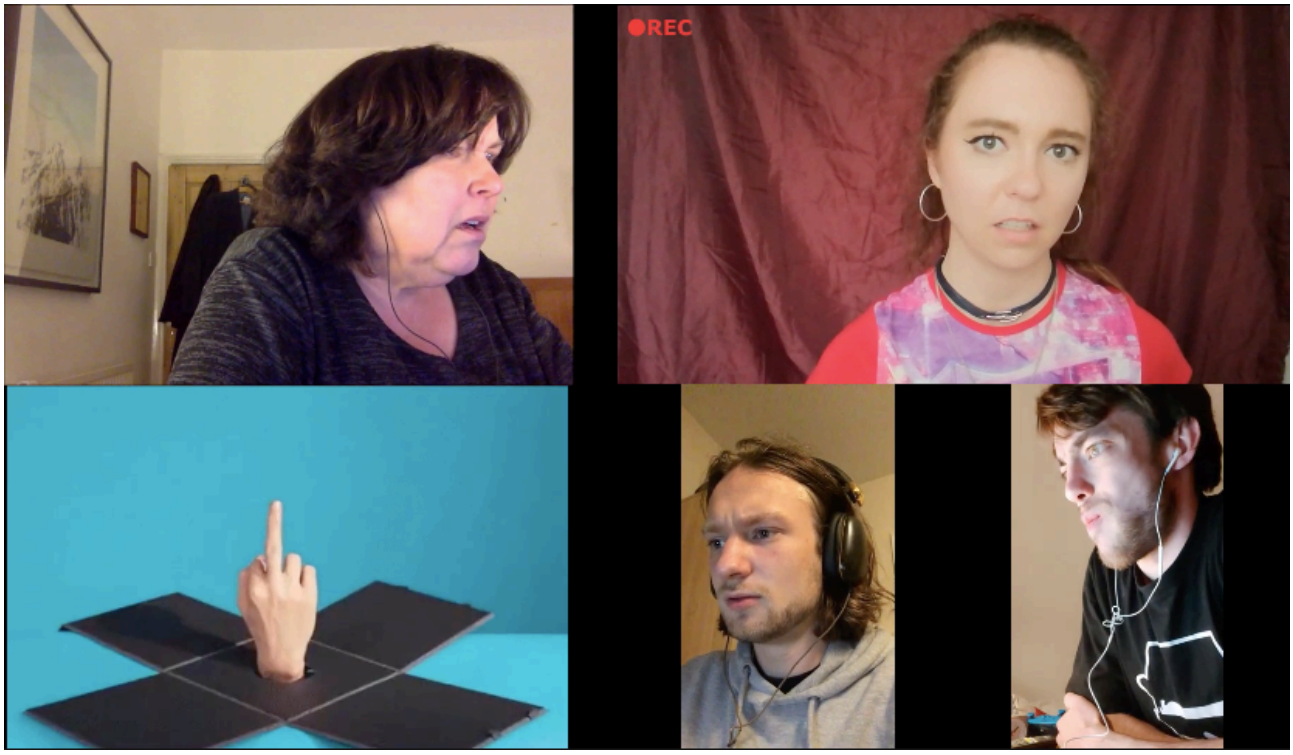

Figure 4.3.) A screenshot from Life_Stream

4.2.4. Conduit

A digital theatre production staged in the audience's email inbox about overcoming loneliness and grief. It was released online in June 2020 and was revived for the online Edinburgh Festival Fringe as part of ZOO TV in August 2020. It was written, directed, and performed by Joe Strickland. This production was funded by Arts Council England.

Content - The digital production consists of five videos that tell the story of a character slowly overcoming their grief and coming to terms with their loneliness. The first video shows the character playing a song they had written about a previous partner that they want the audience to feedback on. The second video takes the form of an ASMR (autonomous sensory meridian response) video, a style of video with hushed speech and foley art performed close to the microphone to illicit a particular feeling from an audience, where the character is whispering into a microphone in order to try and create a video that will allow them to appear closer to their beloved if and when they hear it. The third video is a 360 video that further tries to create a video that can allow the intended recipient to feel in the same space as the character. The fourth video shows the construction and execution of a makeshift volumetric video capture studio, where it is revealed that the person these videos are being made for has passed away, with the video making process being a way for the character to work through their grief. They begin to come to terms with this and, in the final video, they play the Pink Floyd song Wish You Were Here as a silhouette of their dead partner appears in the volumetric capture studio background and rests their hand on the character's shoulder, as if to comfort him. Throughout

the videos anecdotes of their time together are recounted, which get more and more sad and slowly reveal the vastness of the distance between the characters.

Form - The audience is emailed each video with an accompanying message that introduces the video. The next scene is only sent if the audience reply to the email with feedback or advice for the character. The responses from the character will then directly reference what the audience has said, proving that the experience is being operated by a live person and not an automated system. The first, second, and fourth video are filmed with a regular camera phone in the living room of a house. The third and fifth videos are filmed with a 360-degree camera placed in the garden visible from outside the living room window, with scene three focusing the action in the garden and scene five focusing the audience's attention through the living room window. Scene one has a song performed, the audio being recorded from the smartphone acting as a camera without any mastering. Scene two has an extra video layer that shows a visualisation of the ASMR audio in the bottom corner of the footage. Scene four has the furniture moved around in the living room during the scene to make way for a white sheet stretched across a metal frame and a bright LED light. The footage then cuts to a virtual space where a volumetrically captured image of the performer is displayed and, on their command, they are joined by a sky, grass, trees and finally the headstone of their former partner. Scene five shows the silhouette of the performer as they play Wish You Were Here, with audio coming from inside the living room, giving a voyeuristic quality to the final scene. The song is performed with the introduction being played, followed by three repetitions of the chorus, each one getting more emotional each time both in the strumming o the chords and the singing of the lyrics. When the silhouette of the partner appears magically and rests their hand on the shoulder of the character they finally relax. The video footage in the experience could be seen in roughly forty minutes, but the performance often took longer due to the response rate of the audience, even being stretched over several days.

Process - The show was devised, recorded, and edited over a week long period by the performer, essentially using the prompt of, when the character gets more desperate, how do they try and create a more real and present digital version of themselves. The execution of the performance, over email, was chosen to create a truly live digital theatre production that couldn't take place on a stage or in a theatre space. Each audience member receives a semi-unique response to their emails and, when the character feels better at the end of the performance, they offer to talk to the audience to help them with any problems they might have at the moment as a thank you, allowing the performance to extend however long each audience member wants it to. Using a live performer to respond to the emails allowed them to feel legitimately human in their content and response rate, which helped to sell the reality of the narrative in the production and encourage the audience members to care about the character in the story as if they were a real person.

Mood - The audience begins feeling a bit put upon by the character, and then diverges, with some audience members feeling sorry for them and, when the partner's death is revealed, wanting to do everything they can to help. The other audience members tend to pick up on the obsessive and self destructive nature of the character and try to help them by suggesting they stop going down the potentially intrusive and stalker-like path they're going down, normally changing their tune when the partner's death is revealed. This is the intended mood change from the production, as one of the aims of the piece is to try and be more mindful of

people online and to practice the understanding of the bigger picture of the lives of those that we interact with online.

Digital Theatre Category - Mindful Digital Creation

Liveness Wedge Position - Embodiment (Found Footage), Medium ability (not automatic, no specific requirements), High Willingness (Asks audience to continually play a version of themselves and to emotionally invest)

Liveness Characteristics Present - Co-presence of performers and spectators, Ephemerality of the live event, The possibility of interaction, A quality concerning the representation of reality

Liveness Characteristics Absent - Unpredictability or risk of imperfection

Figure 4.4.) A behind-the-scenes image from Conduit, with the 360-degree video shown as two circular images

4.2.5. Myles Away

A text-based digital theatre production about corporate malfeasance and black and trans rights. It was released online in July 2020 and was revived for The Place, Bedford in December 2020. It was written by Tennexa Freeman and Joe Strickland and directed by Schereeya Reed and Joe Strickland. This production was funded by Arts Council England.

Content - The audience begins their induction into the corporate software run by Open Eye Communications, when they are hijacked by the former CEO who has been ousted from the company due to their race and transgender identities. They show a film explaining this before offering up two more pieces of filmed evidence that this is why they were ejected from the company. They then try and recruit you into

helping them take the company down by disrupting their inaugural tech launch; an AI assistant called BINA that the protagonist personally developed and has a great affinity with. The audience hunts for the password for the auditorium control software in some company and employee files and, once this is found, they choose from a range of disruptive options. Depending on their choice, another video plays imitating a YouTube tech news update that reveals that their disruption was significant and successful. The protagonist then asks one more thing of you, to go back into the company files and find a list of all their clients and their log in details for you to leak. Once you do this you are given an email address and asked to download the login details and email them to another character. If the audience chooses to do this they are sent an email in reply thanking them for taking part in making the world a better place, ending the experience.

Form - The Open Eyes Communications system has dark blue text on a light blue background, and the hacker system uses white text on a black background. The text is read out by the former CEO character, with the introductory corporate instruction being read out by a synthetic voice, later found to be BINA. The sections where the audience are asked if they want to help, before the launch disruption and the leaking of client log in data, the audience has a genuine choice if they want to help out or not. If they choose not to they are asked why and then kicked out of the experience, only to be fired from the company for getting lost in their system. If they choose to help they are allowed to roam through company files and directories, which are filled with world building, flavour text, and easter eggs about the employees and practices of the company. The footage displayed by the former CEO is recorded as if a screen recording of a videoconferencing app, or from a smartphone camera. The tech news segment is presented as if by an annoying YouTuber, with an animated introduction and dub step theme song. The file of login in information that the audience can download is a .txt file containing a thousand randomly generated login details for fake customers of the company, including names, email addresses, and passwords. A play through took roughly forty minutes.

Process - The show was written over a month long period, with rehearsals and filming taking two weeks and editing a further two weeks after that. The choose your own adventure style of the show, and to build it using the interactive text-based experience software Twine, was chosen to allow audiences more active and meaningful interaction methods to feel like they were actually deciding to move through the story, rather than just hitting a “Next” button. The fleshing out of the employee files and company documents was done to see how this might affect the audience feelings about the show, to make it feel more like they were digging though actual real-life corporate servers and make the show feel more real and immediate. A system was run in the experience that could track where audience members who finished the experience navigated during their play through, which showed that this extra world building was engaged with during the launch disruption section of the experience but much less so during the log in detail leak section at the end. We think this was due to the different natures of the tasks given to the audience at these sections of the story, with the first being more of a searching task not knowing where the information they seek is, and the second being a more direct and guided task. This was useful to know for future experiences, specifically Flavour Text.

Mood - Ultimately, the audience felt entertained and motivated throughout the piece. The idea of being able to take down a corrupt tech company from the inside is alluring for a modern audience. However, as the

piece progresses more and more is asked of them, and they should start to worry about the consequences of their actions more. The disruption of the launch is fun, but the tech news report shows that their action had specific consequences, so when they are asked to leak personal information they know that something else might happen. When it comes time to acquire that information they end up downloading an actual file to their computer, which is a sudden change in the position of the audience reality-story reality barrier and can feel invasive and uncomfortable by design. This should make them reflect on the severity of the actions they are about to enact; the emailing of this seemingly real log in data to a mysterious email address. Once they do this, they are rewarded with the end of the story, which should evoke an encouraging feeling that, even if something is intimidating, so long as it is the right thing to do you should be brave and go ahead with it regardless.

Digital Theatre Category - Transmedia Creation

Liveness Wedge Position - Embodiment-Immersion (Role play, dissolves audience reality barrier gradually), Medium ability (not automatic, no specific requirements), Medium-High willingness (consistent active participation, increases ask of audience gradually)

Liveness Characteristics Present - Co-presence of performers and spectators, The possibility of interaction, A quality concerning the representation of reality

Liveness Characteristics Absent - Ephemerality of the live event, Unpredictability or risk of imperfection

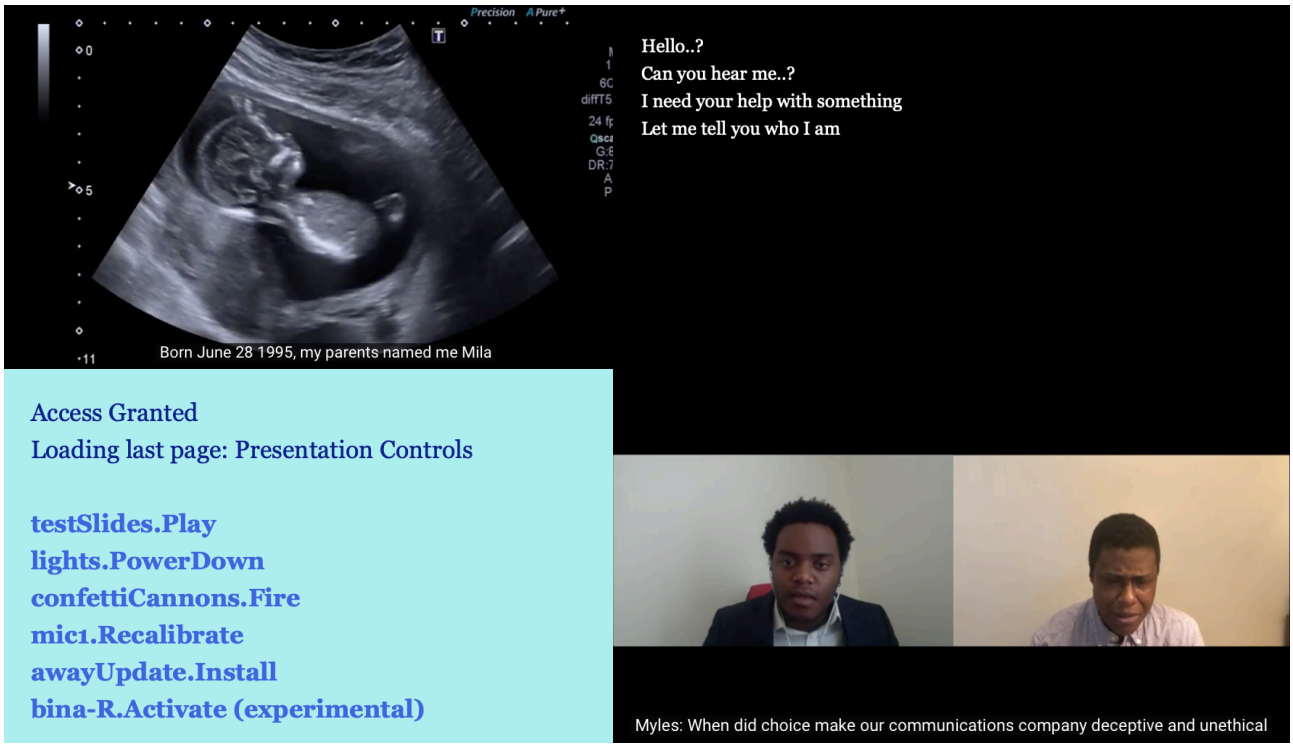

Figure 4.5.) A selection of screenshots from Myles Away

4.2.6. 52 Souls

A digital theatre production where an audience uses a shuffled pack of playing cards to randomly generate a series of monologues about death and mortality. It was released as part of the online Edinburgh Festival Fringe in August 2020 and was revived at The Place, Bedford in January 2021. It is directed by Nat Henderson, Megan Gates, and Joe Strickland, with written contributions from Nat Henderson, Joe Strickland, Lily Bailes, John Peutherer, and Christina Tsousti. This production was funded by Arts Council England.

Content - The production consists of fifty-three short performances, all by a different performer, varying between one and nine minutes in length, but averaging out at about three minutes. These performances span a range of themes concerning death and mortality, as well as a range of forms and genres. Some are comedic, some tragic. Some are informative, others fictional. Some are dramatic monologues, others are naturalistic. Some are theatre, some song, some magic, some poetry, some puppetry. There is also a timer and, after one hour, the audience is directed to a final video consisting of the whole cast of 53 performers delivering the poem Come To The Edge.

Form - The audience has the instructions for the experience explained to them on a black webpage with white text. If they do not have a pack of playing cards to hand they are given the link to an online deck of cards to use instead. They then draw a card and click on its suit, followed by its value, to access the relevant performance. Half way through the experience the suite selection screen changes, offering a Joker option to hear an audio piece instead of the usual filmed video pieces. Each filmed performance begins with footage of a pack of cards with colourful skulls on the backs. These cards are placed on a black velvet tablecloth and a white-gloved hand reaches into frame, picks up the top card from the deck, turns it over, and clicks its fingers, with an echoey finger snap sound triggering the start of the filmed performance. Once an hour is finished the current performance finishes and the audience is directed to the final performance from every performer in the show instead of the suite selection screen. They are then shown credits for the production, automated to only show credits to the performances that they saw as part of their randomly generated curation.

Process - The fifty-three scenes, originally conceived for an in-person production, were written over the course of a month by a core team of two playwrights, with a few other contributors writing and performing their own scenes. Scenes were then rehearsed and recorded over a month with a team of three directors, with each scene being performed by a different performer. The final month was used to edit the footage and create the system to navigate between performances. This was built using Twine, much like Myles Away, but in a branching pattern to allow for audiences to efficiently select their drawn card by choosing their suite and then card value. The system was timed to then offer each audience member a return to the selection screen when their current scene was finished. The scenes were hosted on YouTube and embedded into the experience. A similar system to Myles Away was created that allowed us to see which scenes were viewed more often by which audience members, and which scenes each audience member chose over the course of the experience. This allowed us to infer certain things, such as which performers were getting most friends

and family to view the show, or which performances were the most popular and being watched by the same audience remember multiple times. Each scene was started with a short clip of the card it was linked to being ceremonially turned over to help tie all the performances together by something other than their theme. Four of the performances were about specific songs about death and/or mortality and those songs were embedded underneath the performance to be listened to by the audience if they desired.

Mood - The production creates an excuse and safe space for audiences to think about and consider mortality and death at their own pace. The variety of the scenes means that, as an audience member, you are unsure about the content of the next piece you might watch, but the time limit convinces you to continue with the production knowing that your time will eventually run out. This parallels a lot of the reasons that people don't feel comfortable pondering their mortality, even though this is a healthy behaviour to have to an extent. Creating a system that mirrors this cognitive dissonance allows audiences to more easily address it and gives them a reason to try and overcome it, hopefully planting a seed that might help audiences tackle some of the themes of the show in the future.

Digital Theatre Category - Digital Creation

Liveness Wedge Position - Immersion (Digital Theatre), Medium ability (not automatic, no specific requirements), Medium willingness (Cycles between audience participation and passivity)

Liveness Characteristics Present - Unpredictability or risk of imperfection, The possibility of interaction

Liveness Characteristics Absent - Co-presence of performers and spectators, Ephemerality of the live event, A quality concerning the representation of reality

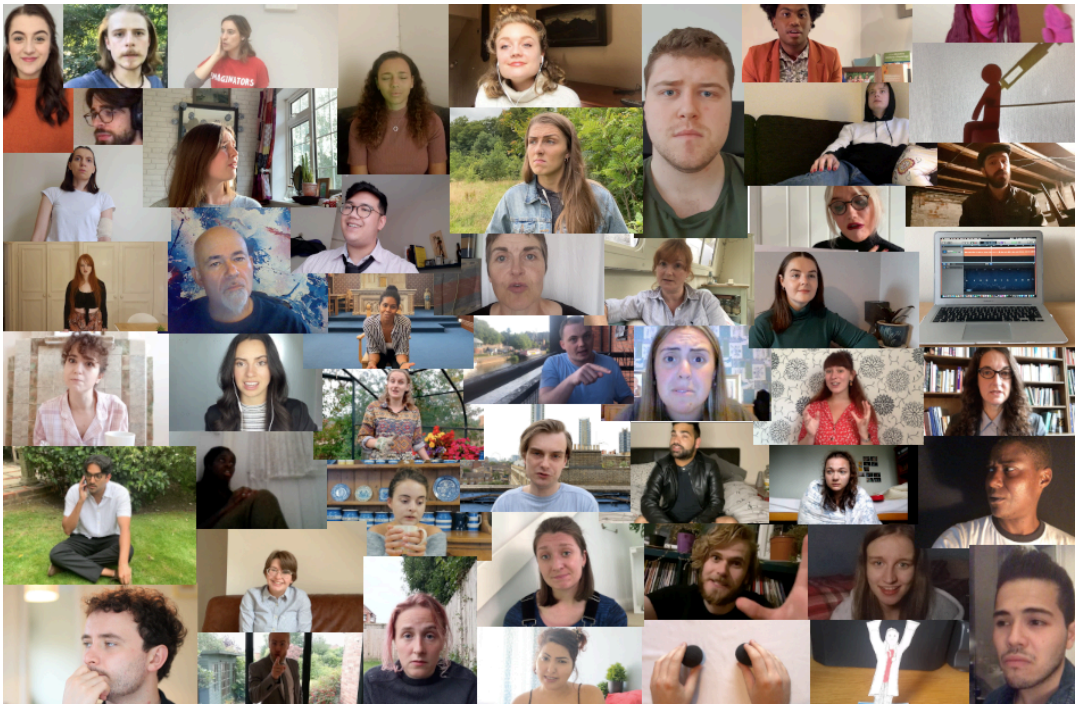

Figure 4.6.) A collage of screenshots of scenes from 52 Souls

4.2.7. Stay Safe

A horror themed digital theatre production performed over WhatsApp. It was released by New Perspectives in October 2020, and revived in November 2020 and December 2020. It was written by Jack McNamara.

Content - The digital production consists of a story about 12 parents in a group chat, usually used for organising school stuff for their kids. One of the parents reports that their child met a strange adult at the school that day, and that the adult was aware of some private and sensitive family information that has freaked the parent out. Another parent talks about how their kid has heard of this strange man and the kid gets on the phone and types about him. Things take a turn for the creepy as the child's messages start to feel otherworldly and several characters log off from the chat. It then becomes clear that some of the people using the chat aren't who they say they are, and that their WhatsApp accounts might be hacked. The characters don't know who to believe, but then pictures and videos of their local area, and even the charters through their living room windows, start being sent making the remains chapters feel unsafe. Most log off and the remaining characters are either vanished mysteriously in a way that defies explanation. A message is sent saying that the performance is over, but the chat is then spammed with creepy text and an image of a scary bloodshot eye.

Form - The audience joins a WhatsApp group via an emailed link. They are unable to type or post in the group, but apart from that it is a real and recognisable WhatsApp group. The performance begins, with text posts and those including GIFs and emoji. Pictures, videos and sound files are also sent during the performance, which the audience is given time to download and play before the messages making up the written performances in the story begin again. The performance was always performed in the evening, over the course of forty minutes between the hours of 19:00 and 01:00.

Process - A WhatsApp account was created for each character in the script, twelve in total, and they were all opened on one computer. Hotkey software was then used to create a series of automated commands to select the correct WhatsApp account, type the correct line of dialogue in the amount of time it would take for a person to type it, send the message, and move onto the next account and line of the play. More complicated actions, such as sending GIFs, images, videos, or audio files, were done manually, with the automated system being restarted once this had taken place. Of the roughly four hundred cues in the show, about three quarters were automated with the rest being triggered manually.

Mood - This show is a great example of a website-specific digital theatre production, as discussed previously in the thesis. The story takes place in WhatsApp and is presented to the audience in the same digital location. This means that when the scary happenings in the story start to occur they feel much more present and immediate for the audience as they perceive themselves to be in the same space as the characters, whom the other worldly effects are being applied to. Audiences felt very scared by the piece, even though it was completely non-interactive, because of how effectively it equated the worlds of the audience and the characters. Also, the stop and start nature of some of the messages at key moments created a huge amount of

tension in the story, where a large number of cliff hangers were created due to the lack of visibility of the charters and their typed words being the only way of knowing what was happening or had happened to them.

Digital Theatre Category - Mindful Digital Category (mindful in form not process)

Liveness Wedge Position - Embodiment (Found Footage), Medium ability (Variable fear responses), Low Willingness (Convincing portrayal, passive audience)

Liveness Characteristics Present - Co-presence of performers and spectators, Ephemerality of the live event, Unpredictability or risk of imperfection, A quality concerning the representation of reality

Liveness Characteristics Absent - The possibility of interaction

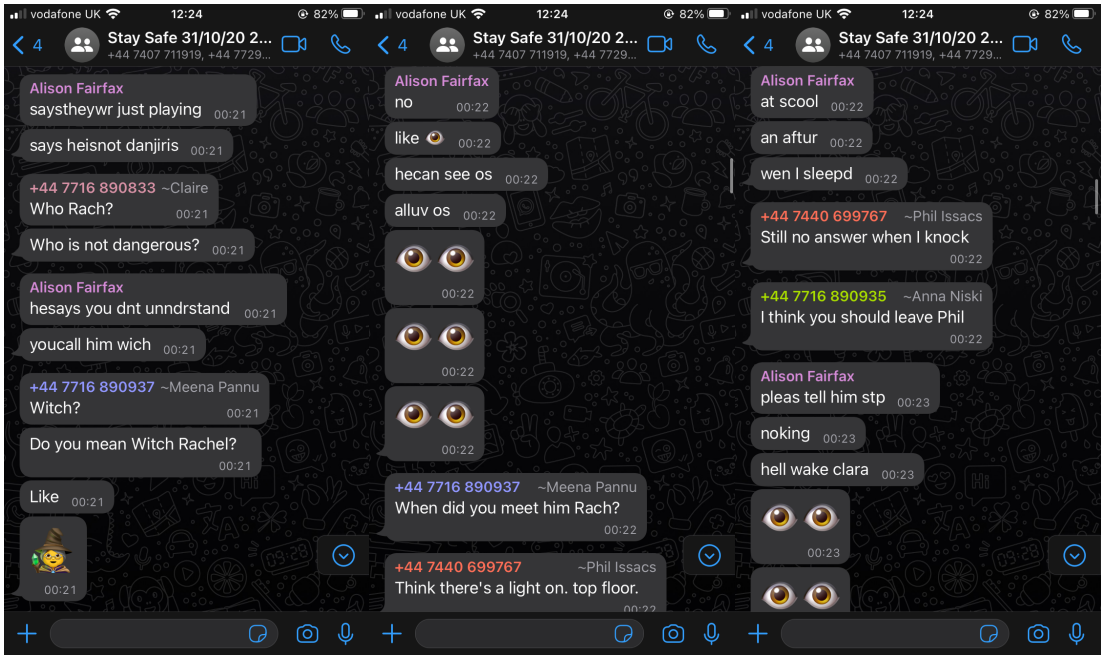

Figure 4.7.) A selection of consecutive screenshots from Stay Safe

4.2.8. Means of Production

An interactive digital theatre production that looks at consumer responsibility in a world of unequal global trade and industry. It was released in January 2021. It was created by Rebecca Saw and Joe Strickland.

Content - A corporately produced introduction informs the audience that they have been hired to help a company, the Pan-National Optic Corporation, resolve an internal incident that occurred at one of their smartphone assembly factories. The audience is then shown the feeds from four security characters monitoring the workstations of four employees; three occupied and one empty. You see the resolution of an argument between two characters before the fourth turns up; a worker moved from another factory. They begin to inspire the spirit of revolution amongst the group, when one of the characters snaps and tries to

maintain order. The arguing pair from the beginning storm off to continue to argue in the toilet. The remaining two talk about why you might put up, or try and change, the situation when the power goes out and one of the arguing workers returns, soaking wet. They say how they accidentally shorted a fuse in the bathroom lights and electrocuted the worker they were arguing with. They all leave, except for the most revolutionary new worker who, once the monitoring cameras are pointed out to him, monologues about his situation down them. The feed cuts to black and, from the remaining audio we hear some factory guards arrive and violently subdue the worker, presuming he is responsible for the power surge. The corporate style video background returns and another assessor asks if the incident they want to avoid is the power cut or the assault. Their microphone is then cut off and the assessment is cancelled, ending the performance.

Form - The experience asks the audience to connect multiple screens or devices through the production website and to place those screens at the compass points around them, as if sitting in the middle of the action. When the production begins video plays synchronised across the multiple screens, with the introductory text playing on the North screen and each character performing on a single screen. If the audience watch on three screens then characters are only visible at the North, East, and West directions. Two screens only reveals the North and South characters. A single screen version of the experience is available where each video feed is placed in a quadrant of the screen so they can all be watched at the same time on one device. Performers were filmed in front of a green screen, with a virtual factory background, built in Unity, inserted behind them. This responded to the lighting conditions of the filmed performances, with the background getting dark when the lights go out on the characters. Each performer wears an anti-static boiler suit, and is clipped to an anti-static mat while they assemble different elements of a smartphone throughout the performance.

Process - The show was rehearsed and filmed over the course of one day, in front of a green screen and under social distancing rules as a result of the Covid-19 pandemic. This necessary step in the process informed the design of the piece, with characters performing on their own screens meaning that performers never had to be in the same place as each other. An earlier read through was recorded over a videoconferencing app in order to create a rehearsal track so that, when each cast member made their recording, it would be in time with everyone else's and they could be assembled together easily in post-production. This was listened to on in ear headphones hidden in the costume. We used post-it notes on the walls of the recording space to give the performers an eye line for where the other characters would be standing. A virtual set was assembled in Unity, with lighting matching the changing lighting throughout the performances. A virtual camera at the correct height was used to record this background along the compass directions so that the characters could stand around the centre point of their environment, where the audience would be situated if watching the show on multiple screens. The website that synchronised the footage for audiences worked by creating a room and allowing multiple devices to log into it, them being automatically assigned footage depending on the number in the room so that audiences wouldn't have a complicated setting up process before watching the experience.

Mood - This is another production which asks audiences to consider their agency and willingness to be active in righting the wrongs that they would traditionally passively watch and appreciate. The difference with this production is that the audience's role is purely voyeuristic in this production, the footage is

presented as having already happened, and they have no control over the outcome. This makes them consider what they would have done if they had control or power in the situation, and what they could do in the real world to try and stop this sort of thing happening.

Digital Theatre Category - Mindful Digital Creation

Liveness Wedge Position - Embodiment-Immersion (Found Footage, Role Play), Medium ability (not automatic, no specific requirements), Medium-High willingness (Passive Role Play)

Liveness Characteristics Present - A quality concerning the representation of reality

Liveness Characteristics Absent - Co-presence of performers and spectators, Ephemerality of the live event, Unpredictability or risk of imperfection, The possibility of interaction

Figure 4.8.) A screenshot from Means of Production

4.2.9. We Ask These Questions Of Everybody

A digital opera looking at the lives of disabled people living under austerity in the UK. It was released online as part of Sound Festival in January 2021. It was written and composed by Amble Skuse and directed by by Toria banks. I was funded by Sound Festival, Creative Scotland, Ignite Ticket Fund, Help Musicians, and Mahogany Opera.

Content - The digital opera consists of two repeated sections. One section is the verbatim adaptation of a PIP assessment, where the disabled citizen and the assessor are played by opposing operatic voices. The other

sections are made up of recordings of people from the UK talking about their experiences living in a discriminating society that disables them. The production lasts for around fifty minutes.

Form - The performances based on the PIP assessment are sung operatically over a rolling soundscape of electronic samples, harp, and woodwind instruments. The audio recorded from the chorus of disabled people varies in quality due to how it was collected, and plays over the same rolling electronic background. All of this audio is accompanied by creative captioning that resembles someone making notes and scribbles on coloured and officially stamped paper, as well as samples of text being typed into a number of word processing and messaging apps. A lot of the scene transitions have a stop motion quality to them, with coloured paper sliding in and out of frame and paper scrunching and unscrunching itself.

Process - The story, lyrics, and music for the production largely existed before the production considered becoming a digital opera. The production was rehearsed over a number of months, to give enough time for the disabled cast and crew to be able to rehearse and record the sound and musical performances comfortably, with performances recorded separately and edited together and mastered in post production. Once the recordings were made the creative captioning was produced over the course of a fortnight using stop motion and animation processes and the production was streamed, then put up on-demand for a month. The website hosting the production also contained a thorough list of content warnings, as well as more contextual information about the themes of the production, to make sure that people could be as informed and aware as possible as to the potentially triggering content of the piece.

Mood - The show is meant to do two things; to force non-disabled audiences to confront the realities of living under austerity in the UK while being made disabled by your society, and to allow disabled audiences to see their story being turned into an opera, something that a minority group hardly has happen in the UK. The overwhelmingly positive reviews of the production show that it hit these targets and audiences left feeling informed and frustrated at the lengths that disabled individuals have to go to be given that which allows them to live or survive at the same level as the rest of the population.

Digital Theatre Category - Digital Creation

Liveness Wedge Position - Embodiment-Immersion (Verbatim Theatre), Medium-High ability (not automatic, ability to trust the disabled experience), Medium-High willingness (not automatic, ability to accept the disabled experience)

Liveness Characteristics Present - A quality concerning the representation of reality

Liveness Characteristics Absent - Co-presence of performers and spectators, Ephemerality of the live event, Unpredictability or risk of imperfection, The possibility of interaction

Figure 4.9.) A screenshot of We Ask These Questions Of Everybody

4.2.10. 24, 23, 22

An interactive digital gig-theatre production (a genre with the live music and energy of a live music gig combined with the storytelling from theatre) about the differences between the lives of people living in the same place and what happened when those lives collide. It was released online in February 2021. It was written by Douglas Deans and directed by Joe Strickland. This production was funded by Arts Council England.

Content - This production consists of two stories, one being told forward chronologically by one character and the other backwards by another character. The forward story is being recalled after the fact and consists of a woman waking up, going to work, and having to deal with horrible and misogynistic men all along the way. She then picks up the ashes of her mum's dog before being mugged in an alleyway by the other character and throwing the ashes of the dog over him. She has had enough and chases the other character through the streets, a shopping centre, and a carpark before he accidentally falls off the edge and dies. The other story, being told backwards, is the story of the boy. It begins with his final thoughts as he slowly dies on the pavement, and takes steps backwards throughout the chase sequence and mugging. It continues to reverse, showing the beginning of that boy's day and how it was filled with people ghosting him and him feeling invisible and lonely and wishing to be noticed by any means necessary. This is filmed as if being logged by the character in real-time and watched back after the fact. The show is in a gig-theatre style, and these stories are presented in a spoken word format with an accompanying lo-fi hiphop soundtrack. The performances last about fifty minutes.

Form - Performers recorded themselves while they walked through or sat down in public spaces. Two performers, one for each character, recorded themselves lip-synching to pre-recorded audio performances

they had made. The other two performers recorded mimed performances, as if their pre-recorded audio was an internal monologue. The lo-fi hiphop soundtrack ran at 80bpm during any scene prior to the confrontation in the centre of the story, and at 90bpm for any scene chronologically after the mugging. The mugging scene itself is performed by the characters simultaneously without a musical background, but each other scene is performed one by one by a single character on a single screen. The audience's computer screen follows the male character backwards through his story, with the end of one scene slowly scrolling up the screen while the other character's scene plays out on the phone, slowly revealing the first frame of the male character's next scene and playing when ready. The audience's phone screen follows the female character forwards through her story, with the gaps between scenes filled with captioned photos and short videos made by the character while she travels between settings for her performances. The audience could use a website to automatically synch their chosen characters across their two devices. They could also choose which characters to watch on a webpage and synch the subsequent videos themselves across their devices if they wanted to.

Process - The audio for the production was recorded over the course of a week, with the filmed performances being recorded the following week, and the week after being used for the editing process. The audio was recorded remotely with performers, with the music being made from a series of lo-fi hiphop samples that were assembled and composed during the editing process. The filmed performances were recorded using a smartphone, a Google Pixel 2 XL, so that they would appear like social media videos one might record of themselves. The gimbal used was robotic and communicated with AI face tracking software in the camera app on the phone so that, when performing, the performers didn't have to worry about framing the shot and the camera would follow them as they sang, rapped, ran through, and performed in various locations around the city centre and outskirts of Nottingham. This also allowed the filming to take place with social distancing being observed as the performers were filming themselves throughout the process. The editing process was complicated due to the fact that all the footage had to be able to be played against two other potential performances, not just the one as was the case in previous productions. This meant that essentially each performance had to be edited and timed twice, resulting in a total of eight, roughly fifty minute long, films being produced for the production. The synchronisation website was similar to that from Means of Production, except it allowed people to choose which character they wanted to follow rather than the number of screens they were watching the piece on, which had to be two for this production.

Mood - The production made audiences feel confused to begin with, showing two stories, knowing they must intersect at some point, but not knowing how or why. Then, the middle of the story occurs, with the mugging, and as the second half continues the audience start to realise that the unfortunate events in the story could have been avoided if the characters hadn't been pushed to their breaking points by the society that they lived in. This should evoke a sense of reflection and reassessment of the audience's own lives and whether or not they are on a similar collision course and whether there is anything they can do to try and avoid this. However, the characters don't have this option and the piece leaves the audience feeling somewhat sad and defeated.

Digital Theatre Category - Mindful Digital Creation

Liveness Wedge Position - Immersion (doesn't try to imitate audience reality), Medium ability (not automatic, no specific requirements), Medium willingness (not automatic, no specific requirements)

Liveness Characteristics Present - A quality concerning the representation of reality

Liveness Characteristics Absent - Co-presence of performers and spectators, Ephemerality of the live event, Unpredictability or risk of imperfection, The possibility of interaction

Figure 4.10.) A promotional image of the filming of 24, 23, 22, used to advertise the production on social media

4.2.11. Hairy Hands FM

An interactive binaural audio experience which allows you to be chased by the Dartmoor legend of the Hairy Hands in your own home. It was released via BBC Arts in March 2021. It was created by Hannah Parsons and Joe Strickland. It was funded by the BBC New Creatives Scheme and Arts Council England.

Content - The audience takes on the role of someone phoning into a local radio station to take part in a radio contest. They are early and the temp answering the phone tells them to wait while listening in to the current show, a local legends segment. The segment is two people discussing the phenomena of the Hairy Hands, a large pair of hands that appear inside cars over a stretch of road over Dartmoor and force them off the road. As they're talking about the hands that spirit appears and destroys the studio, killing all the staff apart from one. Suddenly the audience hears the hands in their home and they are given instructions by the surviving radio host on how to avoid the hands, and eventually defeat them. The phone line is then taken over by a mysterious government figure that tells the audience to keep quiet about the weird phenomena they have witnessed, or else. The performance lasts about twenty minutes.

Form - The audience, after reading the instructions and FAQ for the experience to check that their device and browser are compatible, are taken to a web app where they can test their headphones are working

binaurally and begin the experience. They are given a phone keypad to type in the number for the radio station and this starts the main experience. Dialling different phone numbers reveals a series of comedic easter egg recordings. They are also given buttons to pause and play the experience and an indicator to show that the experience can hear them which flashes up when they speak. The first half of the experience is mastered to sound as if it is coming through a phone line, including grating hold music and background noises reminiscent of the radio station foyer, recording booth, and the destruction of the hands. When the second half of the experience starts, the interactive bit that asks you to hide from the Hairy Hands, the surviving performer asks you some questions which, once the audience responds, triggers the next line of dialogue. The binaural recordings of the hands in the audience's home begin far away and get closer and closer to the audience as the experience progresses. Some of the interactive elements of the show rely on the cooperation of the audience rather than the monitoring of their behaviour, with the audience being given clear instruction to execute certain behaviours at the correct moments to make the experience synch up with them.

Process - The experience was produced over a period of six months, with the script and sound design being researched and developed over this time. Recording the voice acting, and the binaural sound design was conducted over the next two months, with the final two months consisting of the mastering the audio, the user experience design, and the play testing and honing of the experience before its release. The production was recorded remotely, with no performers or collaborators ever meeting during the process. The sound design was recorded using home made binaural microphones and a selection of household objects to produce an otherworldly foley design for the Hairy Hands and the way they interacted with your home environment. The user interface was created using Unity, making several slides of instructions and a final slide with the phone keypad simulator, with buttons, a display, and indicators all responsive to the behaviour of the audience. Another script was used to listen to the mic input of the audience's device and to trigger the next part of the story at the appropriate moment when the audience had finished responding vocally to the character in the experience. This was then exported and hosted online to make it accessible to audiences regardless of the device that they were viewing it on. Two versions of the experience were prepared, one for a moving audience and one for a seated audience, but only the moving audience experience was finished, tested, and released. The user testing involved around twenty people who had a range of devices, internet connection speed, and technical abilities, which helped us assess how easy to use and functional the draft experience was. Some changes were made and the finished project was released.

Mood - The point of the experience was to create an audio coat of paint to make the house that people had been locked down in for the past year to seem more interesting and exciting. It also used the Hairy Hands as an unknowable force that the audience is initially scared of but works to overcome to show the audience that, even if you are living in a time of great uncertainty and seemingly insurmountable odds that, so long as you keep going and find others that want to fight alongside and help you that even the most terrifying odds can be defeated. The radio show is designed to be informative and to lull the audience into a false sense of security where nothing scary has happened by the mid point of the experience. Then suddenly the Hairy Hands turn up and everything gets turned upside down. The binaural sound, only kicking in halfway through, suddenly thrusts the audience into the middle of the action, or rather it thrusts the action from the story into

the world of the audience in a way that forces them to confront and overcome the horror of the Hairy Hands. Once they defeat the hands, the audience feels a great sense of triumph and success and is left feeling satisfied at the end of a perilous and scary journey, an encouraging feeling that should help them tackle these sorts of difficult problems in their life moving forwards, at least a little bit.

Digital Theatre Category - Mindful Digital Creation

Liveness Wedge Position - Presence (story brought into audience's home), Low ability (uses general knowledge and human instinct), Willingness N/A

Liveness Characteristics Present - Co-presence of performers and spectators, The possibility of interaction, A quality concerning the representation of reality

Liveness Characteristics Absent - Ephemerality of the live event, Unpredictability or risk of imperfection

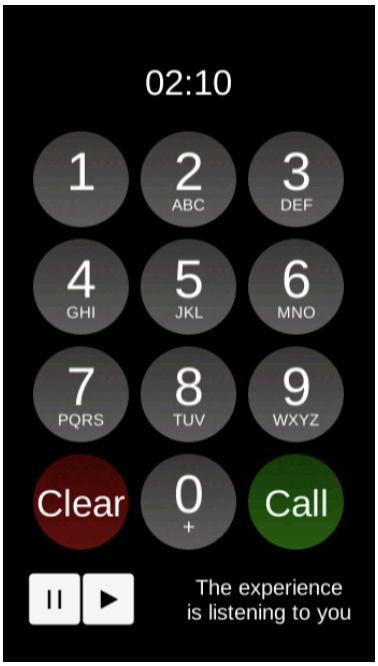

Figure 4.11.) A screenshot of Hairy Hands FM

4.2.12. Flavour Text

A text based digital theatre experience allowing the audience to fall down an internet rabbit hole and uncover a wide reaching government conspiracy. It was released online in March 2021. It was directed by Joe Strickland and written by Megan Gates, Charlotte Holder, Ruth Mestle, Harry Smith, and Sophie Whitebrook. This production was funded by Arts Council England.

Content - The show begins with the audience being told to try and find out why their favourite Italian restaurant has closed down. In doing so they navigate across a series of websites, finding clues to slowly but

surely uncover a government conspiracy about silencing an early noughties indie band that overheard a classified codeword behind the scenes of the Royal Variety Performance, and their fans who accidentally guessed what happened to them. The audience travels through modern day review websites, nostalgic social media pages from the characters' teenage years, and eventually secretive and dark web pages. The show ends with a revelation of the truth and the audience is given the option to email this to a journalist to have it revealed, but the upload is blocked and they are given a final warning to not meddle in these affairs any longer. The experience can take anywhere between forty-five minutes and several hours depending on the speed at which the clues are uncovered or the amount of detail in the webpages that the audience engages with.

Form - The websites that make up the experience are all individually designed to evoke different types of websites throughout the past 15 years of the internet, be that review websites, business websites for hotels or restaurants, early social media pages, online forums, corrupted email inboxes, or the directories of websites. Each website has its own distinct colour palette and style, and included a large amount of world building written into the websites to make them feel real, used by a multitude of users, and part of a world that the story took part in. Other elements to help create a real feeling world include a recorded song, fake cctv footage, emails that arrive for the audience in real-time and a captcha. As the experience progresses more is asked of the audience, including the signing of an NDA and the downloading of confidential documents. The audience is told to take screenshots throughout the experience of any clues or potentially important information, which they bundle together with the confidential documents and email off to a sympathetic journalist. If the audience were to get stuck at any point there was an actively monitored Twitter account for the journalist that could be interacted with in order to ask for hints and tips to make their way through the experience.

Process - The writing team began to flesh out ideas for a story that would make sense to be told solely in online comment sections and other places where the public can post or edit text on the internet. We used a traditional writing structure, built out of five acts, and assigned each writer an act to flesh out, with a three act structure taking place within each of the five acts, each of those sub-acts taking place on one website or webpage. Once these were written over the course of two weeks, the webpages they were set on were built and the text was copied and adapted to fit the pages, making sure that the links between the sites were prevalent enough so that the audience would be able to make their way through the story without getting stuck for so long that they gave up. Once finished, extra written material was produced to fill out any areas of the websites that didn't feel lived in or posted on enough. This created a false iceberg style effect, where what was visible to any audience member seemed large enough that a larger amount of content under the surface could be presumed even though there was none there.

Mood - This production begins by creating curiosity in the audience and giving them a few easy jumps to make so as to encourage them to move further through the story when it becomes more difficult to do so. The audience's curiosity starts to develop further and eventually turns into confusion, followed by a drive to understand the ever growing web of narrative that unfurls in front of them. Once the main revelation drops, and the conspiracy is revealed, the experience changes tack and the audience moves from a feeling of relaxed

curiosity to a feeling of urgency as they have to prepare a package of evidence to email to a character to try and reveal the events of the conspiracy. They get to see this evidence begin to upload before their upload is stopped and deleted by a government official and they are given a final warning to cease their investigations before the experience ends. This seems like it might be an unfulfilling point to end the experience but the ending is very complimentary of the audience's abilities and is supposed to increase their confidence in their ability to uncover and affect change in the world.

Digital Theatre Category - Transmedia Creation

Liveness Wedge Position - Embodiment (ARG using blend of real and fictional websites), High ability (prior knowledge of the online world necessary), High willingness (audience needs to play along)

Liveness Characteristics Present - Co-presence of performers and spectators, The possibility of interaction, A quality concerning the representation of reality

Liveness Characteristics Absent - Ephemerality of the live event, Unpredictability or risk of imperfection

Figure 4.12.) A screenshot from Flavour Text

4.2.13. There's Something Among Us

An interactive digital theatre production looking at the performative online lives of social media influencers and what happens when the real-life consequences of online actions come back to haunt you. It was released online in April 2021. It was directed by Joe Strickland and devised by the cast, around a skeleton written by Joe Strickland.

Content - The production begins with an introduction that sets the tone of the experience as a presentation of found footage from the lead up to a fire that killed five YouTubers who all lived together in the same house. The audience is then shown the footage, that consists of the YouTubers introducing themselves to their fans and playing three games of Among Us, with them talking off camera to each other in-between each game. These game aftermath conversations show the tensions and fractures in the group widening and being pushed to breaking point by the exiling of a previous housemate from the social group and the introduction of a new and grating influencer. Harsh truths are revealed and the relationships of the group are torn to shreds, with several walking out. When the others try to leave they realise they have been locked in by the exiled housemate, who was secretly living in the basement and heard them all talking badly about him. An accidental fire then breaks out as they can't remove a cake from the oven and the found footage ends. It becomes clear that the person who has presented this footage is the exiled housemate who is now begging people to not keep calling him a murderer, him believing this footage exonerates him and shows their deaths to be accidental.

Form - The introductory and epilogue text is white on a black background, with the faint sound of a fire crackling behind the reading out of it by the performer who plays Sam. As can be seen in Figure 4.13., Footage of the performers is arranged similar to a multiplayer Let's Play. If no game is in session then the focused on character fills the screen, with the other six character feeds shrunk down and lined up along the bottom of the screen. If a game is in session then the game footage is full screened, the focused on character is shrunk by a third and placed in the top right corner of the screen, with the other characters along the bottom of the screen as before. During the game when their character is playing only they can be heard and when the discussion section begins only those players left alive can be heard, with dead characters having their footage made grey-scale to indicate their exclusion. When a choice is asked of the audience as to which character they should follow in the next game of Among Us, seven options come up on the screen as the video pause, one for each character. The audience can take as much time as they want to make a choice and, once they have, the chosen edit of next video plays straight away.

Process - The cast spent a month playing the game and devising their characters and the ways in which they would interact, both during the event of the production and before the audience sees them. Multiplayer gameplay was then recorded by each cast member simultaneously and multiple times with the most interesting games, from a narrative perspective, being chosen for the final production. This meant that each game was recorded from every character's perspective and allowed us to create an experience where the audience could truly choose any character to follow. The script was then formed around the outcomes of these games and was improvised through over the course of a month before finally being recorded simultaneously by each performer. This was achieved by the performers being on a videoconference call together and recording themselves on a separate camera at the same time, allowing footage that could easily be played together to be created. Two weeks were then taken to edit this footage together and to build the navigation experience using TweeVee, a lightweight HTML and Javascript software for creating interactive video experiences using Twine and a series of video clips. This was hosted on GitHub, with the videos being hosted on Dropbox and streamed into the experience during the audience's viewing of it when necessary.

Mood - This production piques the audience's curiosity with its found footage nature and by stating that five YouTubers will die in a fire, but then introducing seven characters. Giving the audience control over which character to watch also allows them to feel in control of the story, even though they know this isn't the case as the introduction makes clear the inevitable outcome of the experience. However, the sections focusing on the characters playing the game, muted from the other performers, create a sense of faux friendship between the audience and the influencer they have decided to focus on, amplifying the sadness at the end of the piece when their favourite character might perish in the fire. The end revelation that the exiled character is behind your being able to view the production in the first place adds another layer of discomfort to the piece, you not being sure if you have in some way supported or helped assuage the guilt of a murderer by not only taking part in the experience, but by doing so in an active and willing way.

Digital Theatre Category - Mindful Digital Creation (form rather than process)

Liveness Wedge Position - Embodiment (found footage), High ability (prior knowledge of the online world necessary), Mixed willingness (Higher if ability lower, lower if ability higher)

Liveness Characteristics Present - Unpredictability or risk of imperfection, A quality concerning the representation of reality

Liveness Characteristics Absent - Co-presence of performers and spectators, Ephemerality of the live event, The possibility of interaction

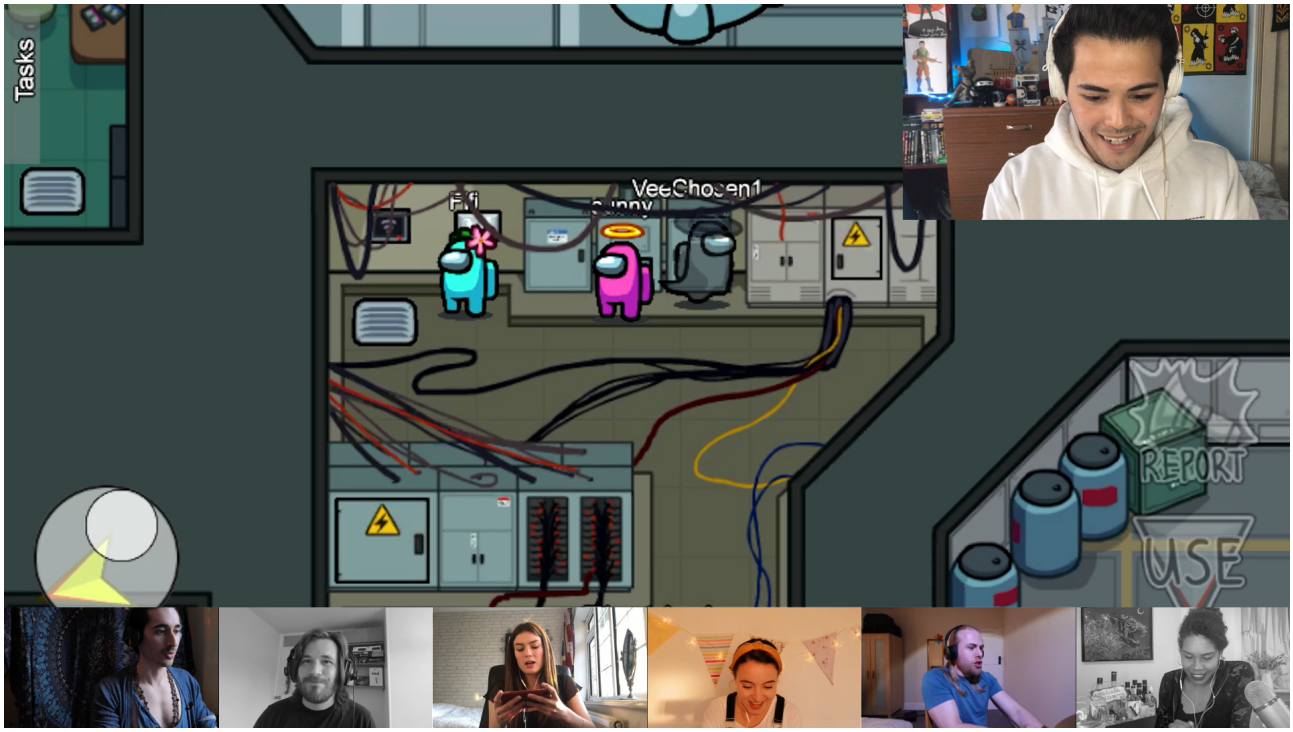

Figure 4.13.) A screenshot from There's Something Among Us

4.3. Summary

It is this researcher's opinion that the above dramatographic analysis is a significantly useful battery of analytic tools to distinguish between, and better understand the content of, the often lazily and unfairly combined genre of digital theatre. To an extent, given the range of automation software that triggers or controls lighting, sound, and projection on stage, all modern professional theatre is "digital" to some degree, and to lump significantly different productions together under the same umbrella term can only ever be useful if your aim is to generate an "us vs them" between the traditional theatre world and the "digital" theatre world. I'll continue to use the term digital theatre to refer to theatrical and live experiences that include a substantial amount of technology in their creation or dissemination, but it should be noted, with this analysis as proof, that the medium of digital theatre is by far more diverse in its inception, execution, and consumption than a traditional theatre medium could be. The use of Taylors (& Andrews 1993) evaluation process allows us to explore each artwork or experience through a multitude of insightful and tried and tested lenses, with further inclusion of analyses based upon Georgi's Liveness categories (2014) and my own Liveness Wedge helping to further pick apart the individual differences in the quality of Liveness between the different theatrical experiences. This creates an analysis methodology that, due to its basis in broad visual art and Liveness analysis, can apply to any theatrical experience, including those belonging to the realm of digital theatre.

Now that we have agreed-upon a thorough and widely applicable digital theatre analysis methodology, once I have reported on the design of the research experience itself, hereby referred to as the artefact, I can analyse it to better understand the digital and theatrical contexts that the artefact exists in, in order to more specifically match my findings to the artefact and ascertain the applicability of the findings to a broader range of experiences, which would then allow them to be reliably used to build guidelines for interactive narrative or digital theatre experiences moving forwards. The analysis process presented in this chapter will also allow me to understand the research experience in more detail prior to the research beginning and identify any features that could potentially interfere with the research outcomes, especially considering the importance of measuring audience Enjoyment to our research. Furthermore, it will allow me to consider the research experience in more precise ways during its inception and construction with the knowledge that it will eventually undergo this analysis helpful in guiding these steps more accurately towards my desired artistic and practical goals for the research experience, that is to say it being a useful tool in answering my research questions, creating measurable Enjoyment in my participants without impeding its own ability to do so. My practice is not always guided in such a precise way, with many creative projects starting off as vague ideas and slowly coming together as the project progresses towards a set goal. Inspired by this analysis, I will use more thorough milestones and guidelines then I usually use to create a work of this nature, discussed as chapters throughout Section 5, to ensure a desired research experience is created. To do this as fully as possible, I should also look at the development of the features, and the eventual whole, of the artefact in detail. These features fit within a broad range of categories, including the mechanical, the aesthetic, and the experiential, but a detailed description of these features, how they were developed, and why they were chosen, will allow me to better understand the artefact, which in turn allows me to more accurately position the research using that artefact in the grand scheme of the landscape of interactive digital narratives.

5. Artefact Design

From the previous chapter, I have unearthed and organised some thoughts and guidelines about what a digital theatre experience might entail to be able to be classified as both appropriately digital and appropriately theatrical.

It is a theatrical convention that audiences should suspend their disbelief when it comes to certain elements of a production. While nowadays we have production budgets that can recreate settings on stage in great detail, or immersive and site-specific performances that tell stories in a relevant location, a lot of theatre still asks audiences to imagine and pretend along with the performers. Whether this is to imagine the location of a story in a black box space with only lighting and sound to guide you, whether it's to imagine that time has passed or rewound outside of the rules of nature, or to ignore that the person in front of you is so and so off the telly, the audience is asked to actively imagine. We are not used to having to do this on the internet, where if anything people believe what they see without interrogation unless practised. This means that digital theatre, until a tradition is more established, should probably try to fit in with the online spaces it is being performed in. This should be taken as a catalyst for creativity rather than a hurdle; an opportunity to tell digital stories to digital audiences that wouldn't be as effective in their desire to entertain, enlighten, or socially bond in any other format. To create website-specific theatre in the same vein as the site-specific theatre performed in real-world spaces to great success.

Likewise, there is a lot of technology which was not initially built for storytelling in the way that storytellers now want to use it. This means that any digital theatre maker will come up against an inevitable issue in an online platform that they'll have to work around if they want to create a seamless experience for their audience. Alternatively, they can also try and build this seam into the experience. Much like Blast Theory in many of their multiplayer in-person and online art experiences, the seams of an experience shouldn't be ignored and the audience shouldn't be asked to suspend their disbelief, but these seams should be embraced as catalysts for creativity and opportunities to make a more bespoke and organic experience for audiences. As I discussed, audiences aren't practised at suspending their disbelief in online spaces, and probably have a lot of frustration built up over the years caused by malfunctioning or counter-intuitive technology, so any potential issue they might encounter is probably best to turn into a feature of the experience you are wanting to create or the world that your story takes place in.

One of the most important take aways from Chapter 3 is that Presence is a feature of the audience's mind and not of the presentation space of the experience, but the previous definition of Presence, as defined in Section 3.2. in relation to Liveness, can be further interrogated. Presence is a feeling that one can create in the mind purely through electrochemical means and, therefore, does not need to depend on the physical environment of the audience. Likewise, Presence is something that can be felt without the physical presence of another living thing, such as with hallucinations or as the "demons"reported by some people during episodes of sleep paralysis. It is also a feeling that can be absent even when a living thing is immediately near by the perceiver. People who are physically present, but ignoring their immediate environment, and said to be "away with the fairies" or having their "mind elsewhere", colloquial indications that we might not consider them fully

present even when their physical body might be in front of us. This is particularly interesting as it reveals a key feature of Presence; communication. Presence isn't just about the physical location of another individual, but that that physical location, being near to you, means that that individual can interact with you, see you, might be able to help you, might be a threat to you. It's easy to overlook this because for almost the entire history of humanity there has never been an option to perceive someone, in the present who isn't within your vicinity or physically within reach of your senses.

It makes sense for humans, an incredibly social species who also had to keep an eye out for animals to hunt or avoid in the wild, to have an innate feeling of "someone or something else is nearby". But it is important to remember that Presence, just like any other feeling, occurs in the mind and, although routed in perception, can be manipulated via misperception to occur. The magician vanishing a coin from their hand is only impressive because you initially believe it to still be present there, even though it isn't. This above example also shows that Presence isn't just a feature we apply to living things, but to inanimate objects too, though maybe only those that we might want to interact with. Or is the surprise not with the coin but with the magician themselves, the person who was able to make the impossible thing happen? The person who can control Presence?

This leads to the following conclusion about Presence:

Presence is a perceptual construct that is felt by an observer when they believe that they are able to communicate with another being, whether physically located in their immediate vicinity or not.

Communication in this example refers to the meaningful two-way transfer of information between two agents. However, this is once again a quality perceived by the observer and not an innate quality of the situation they may find themselves in. As a result, the magnitude of the meaningfulness of the communication can be simulated or manipulated to create a feeling of communication, and therefore Presence, where no true instance of these qualities actually exists.

This is the core concept for being able to create a digital theatre piece. Though characters in a traditional theatre production don't acknowledge the audience, or only during certain dramaturgical moments, such as soliloquies, the audiences' brains still recognise that there are people in front of them and that if good or bad things happen to them there is a chance that those same events could befall the audience due to their physical proximity. However, this quality does not translate through a screen particularly well. Therefore, in order to create digital theatre, with a focus on digital Liveness or presence, a substitute for this lack of physical presence needs to be constructed. Fortunately, this can be done by inserting the audience into the story in some way. Whether giving them an active role, like in a video game, or suggesting that the fate of the characters might befall them in some similar way, such as with a found footage horror film, audiences can have the events of the story feel immediate and present in a way that might not otherwise happen in a digital theatre piece.

Keeping this in mind, I began to plan the initial stages of my research experience. I knew that I had to keep the following five provocations in mind:

1. It has to make sense that it's set where it's set (to help the audience suspend their disbelief)
2. I need to build the story into the seams of the technology presenting it (to help the audience suspend their disbelief)
3. Interaction with the character has to be equivalent to everyday interactions (to create a feeling of communication)
4. Interaction with the character has to feel meaningful and influential when appropriate (to create a feeling of communication)
5. The audience has to have an active role in the story, either as a character or playing themselves (to help the audience suspend their disbelief and to create a feeling of communication)

With these in mind, let's look at the process through which my research experience was designed, bit by bit, and at which points these five provocations came into play. To begin with, we'll look at the basic building blocks of User Experience design for interactive audio/video applications by examining the design ad implementation process behind an initial interactive video project, called Heart Attack Simulator. I'll follow this up with practical experiments in volumetric video capture and experience location design to examine the aesthetic and feel of the performance delivery and setting of the experience. The next step will involve looking at the gathering, refining, and utilisation of audience behaviour data, which will then feed into the final design stage of crafting the experience that responds to this data, with the aforementioned UX design and aesthetic choices, to create a fully functioning and meaningfully interactive narrative experience.

5.1. Heart Attack Simulator

The first experience I made was the Heart Attack Simulator, an interactive film, in which the audience could choose which paths a character could take to move through the aftermath of a house party to find their heart medication, lost there the night before. Figure 5.1. shows a collection of screenshots from this experience. A performer recorded the necessary video from a first person perspective. An app was then built to play the video clips in the right order depending on the decisions of the audience at specific points in the story, communicated by pressing one of three buttons via keyboard input; left (left arrow), right (right arrow), and have a heart attack (the 'H' key).

The important elements of this initial step were to get to grips with creating something narrative based and interactive in Unity, in which an audience member could both control the direction that the branching story would go in and would have a satisfying ending no matter which story branch they ended up going down. As to be expected, there were various problems with this experience. The initial experience didn't limit when the audience could respond to the story, allowing people to press buttons at any point during a particular video clip and skip ahead to another piece of video intended to be played later in the story. This destroyed

their understanding of the narrative in the piece. This is an example of error caused by too much audience communication.

Figure 5.1.) Screenshots from Heart Attack Simulator

Similarly, if people didn't make a decision at the appropriate point, the video clip they were on would either pause or loop, which didn't make for good audience experience either as this broke the immersion of the piece, essentially punishing the audience for not making a decision fast enough when they may not have been aware that they had to. This is an example of error caused by too little audience communication.

In response to this feedback, extra code was written to only allow audience member responses at appropriate times in the experience and video clips were edited to end on a prompt to respond at that time, in case this wasn't clear to the audience. If the audience failed to respond in spite of this prompt then the experience would pause on the prompt until a response was made by the audience.

Heart Attack Simulator emphasised the need to build instructions natively into an experience that was unfamiliar to the audience. Theatre goers know how to watch most plays, gamers know what to expect with the controller layouts of most games, but many people are unfamiliar with this sort of interactive experience, and the experiences themselves vary so wildly that, more often than not, some sort of tutorial or reminder system is helpful to allow audiences to navigate the experience effectively. I framed it as if I was treating them like another performer, one who performs for themselves, and needs just as much direction and familiarity with the experience as any other member of the cast or crew. This thought process was carried through to future experiences and was a key point of inspiration for the organic and data-driven control mechanics used in the final research experience.

Another point about this experience is that it was purposefully designed to have a quick playtime so that the multiple paths of narrative would be able to be investigated by an audience in a single session. There's an interesting question as to whether a branching narrative matters if the audience don't get to experience the multiple pathways and see how their behaviour affects the story told to them. If you're anticipating audiences to have a single run through of the experience then a branching narrative might only be an effective storytelling tool if audiences will be able to compare their versions of the story to one another, otherwise storytellers might prefer to focus their attention and resources on crafting a polished shared experience for all their audiences. This is utilised in a number of immersive theatre experiences, such as those produced by Punchdrunk, where a central bar area is specifically built into productions in order to act as a discussion hub between friends who have taken separate paths through the immersive story. However, if the story is easy enough to experience (short in duration, entertaining, affordable, accessible, etc), or being presented to an audience eager to experience it multiple times then this can be a versatile tool for granting the audience agency and allowing them to not just meaningfully interact with your story, but to do so in multiple ways. This is normally seen in non-linear short-form video games, such as *The Stanley Parable*, where the means, motive, and opportunity to replay the story all easily exist for the user. This creative exercise allowed me to clarify my feelings towards the uses of branching narratives in interactive digital experiences, helping me make the decision to build so many branches of the narrative into the final research experience due to their ability to be inferred by audiences and therefore allow the audience to understand the importance and meaningful nature of their actions, a key component of the communication described as integral for Liveness to be achieved in a digital experience, as outlined in the introduction to Section 5.

Something else to mention is the inequality of the branches in this experience. Every video clip in Heart Attack Simulator ended with a choice of where to move next in the story, similar to the interactive Black Mirror episode, Bandersnatch. In this experience, some of the choices allowed the experience to move forward, while others would lead to the humourous death of the protagonist, either unexpectedly or on purpose via the use of a restart button that made the character have a heart attack wherever they were in the story. Most audiences are used to linear stories being told in a complete and uninterrupted way, so this alternative and more interactive style of moving through the story can be seen as creating unintended punishments for making, in this experience's case, arbitrarily wrong decisions and forcing the audience to begin the experience again. It would be advised that, moving forwards, all branches of an experience should meaningfully move the story forward so that the ending of each narrative may lead to the audience having equivalent experiences. A punishment system, while still having promise due to the artistic justifications of uncomfortable interactions as previously discussed in Section 2.1.1., should be used when appropriate so not to accidentally jar with a particular story where it doesn't make sense, or audience who might be unfairly put off an experience due to the difficulty or lack of experience with the idea of failing to move through a story without ease.

5.2. Hologram Characters

While the Heart attack Simulator was an interesting and valuable creative experiment to understand more about the user experience side of making my research experience, it was missing one major element, that is to say, a character to interact with. Before deciding who the character will be, what they will do, and how they'll respond to the user's behaviour, a decision on how to present this character needs to be made.

5.2.1. Holocap

The aim for the research experience is to be able to measure audience Enjoyment, and to try and create an experience that feels as present as possible in spite of the absence of an intelligent conversational partner. For this reason, the decision was made that the final experience would use volumetric video and not an entirely computer-generated character as it would allow for a real human performer to play the part of the character, as well as allow the character to look exactly like a real human conversational partner as they would, at least from a visual perspective, be one. Various volumetric video and FVV software was considered and tested but I settled on using the software Holocap for the final experience as it allowed me to create volumetric videos, known as holocaps, that looked the most like real people with the resources at my disposal. This was important for the feel of this experience, as I was attempting to create something lifelike in as many ways as I could. The software uses a depth camera that records both video and depth information to not only create a 3D video object, the holocap, but to detect the edges of a performer and not record the background behind them, much like using a green screen. The holocap itself is best viewed from the position of the camera that recorded it to avoid distortions in the image, but if the audience could remain seated for my experience and not asked to move this would not present as an issue for us. A Microsoft Kinect V2 was set up on a tripod in front of a monochromatic wall of the lab and several test holocaps were taken of a researcher. Sound was not captured for these tests, though the software allows for sound to be captured and played back in synch with the holocaps. Test holocaps were taken of the researcher standing up, sitting down, and sitting behind a table, both covered so it would not show up in the capture and uncovered so that it would.

Certain actions and behaviours were performed to check how big the artefacts these caused were, if at all present. Actions that changed the depth of the body being recorded, such as arms being stretched out in front of the performer so as to block their torso or face, were problematic for holocap capture so these movements were limited in future capture sessions. This wasn't problematic for me due to the limited movements available to the seated performer during the story anyway, although care would have to be taken for when the performer leans across the table to show anything to the audience member. I also experimented to determine if other visual elements of the performances would become problematic with the artefacts that they might create. Certain features, like dull coloured clothing, transparent objects like glasses, or very detailed items, such as long, untied hair, also didn't translate into a high quality of capture, so these were also carefully controlled in future capture sessions with performers wearing bright colours to stand out from the background, have few transparent or reflective objects on their person, and have hair tied back or styled in specific ways. Screens, such as the smartphone prop, were also not reliably captured, so a shift towards more

analogue props, such as flash cards or a notebook, was included in subsequent capture sessions. When viewing the test holocaps back, I tested for distortions caused by the parallax effect of audiences leaning or repositioning themselves in their chairs but, at the distance that they would be presented at, the holocaps held up and were artefact free in this instance. The test was successful in letting me judge that Holocap was the right software for my experience and informing me as to how to better design the aesthetic of the experience so as to not cause ourselves problems with unwanted volumetric video capture artefacts, thereby creating my experience within the seams of the capture software and allowing me to create human looking characters that would allow an audience to more easily accept interacting with them as equivalent to an everyday occurrence.

5.2.2. Final Holocap Set-up

Having experimented with using Holocap, it was time to try and set up a controlled and perfect environment for capturing the holocap files. A white fabric screen was set up, with a stool of adjustable height in front of it. The stool was on wheels and a metal bar was placed in front of the fabric screen to allow the seated performer to both easily move the stool and avoid disturbing the backdrop. The Microsoft Kinect V2 camera was set up on a tripod around 2m away from the stool where the performer being captured would sit. A Blue Yeti microphone was placed at the foot of the stool to capture audio from the performer while still being put out of shot. A performer was brought in for this final holocap test and was directed to deliver some lines to the Kinect from a sitting position, looking at the video camera module on the Kinect while doing so to allow for audience eye contact to be simulated. Figure 5.2. shows the results of this recording process. There were some artefacts from the recording process, such as the holocap freezing while the audio continued recording, but these were left in due to it being a prototype version of the experience that this footage would be used in.

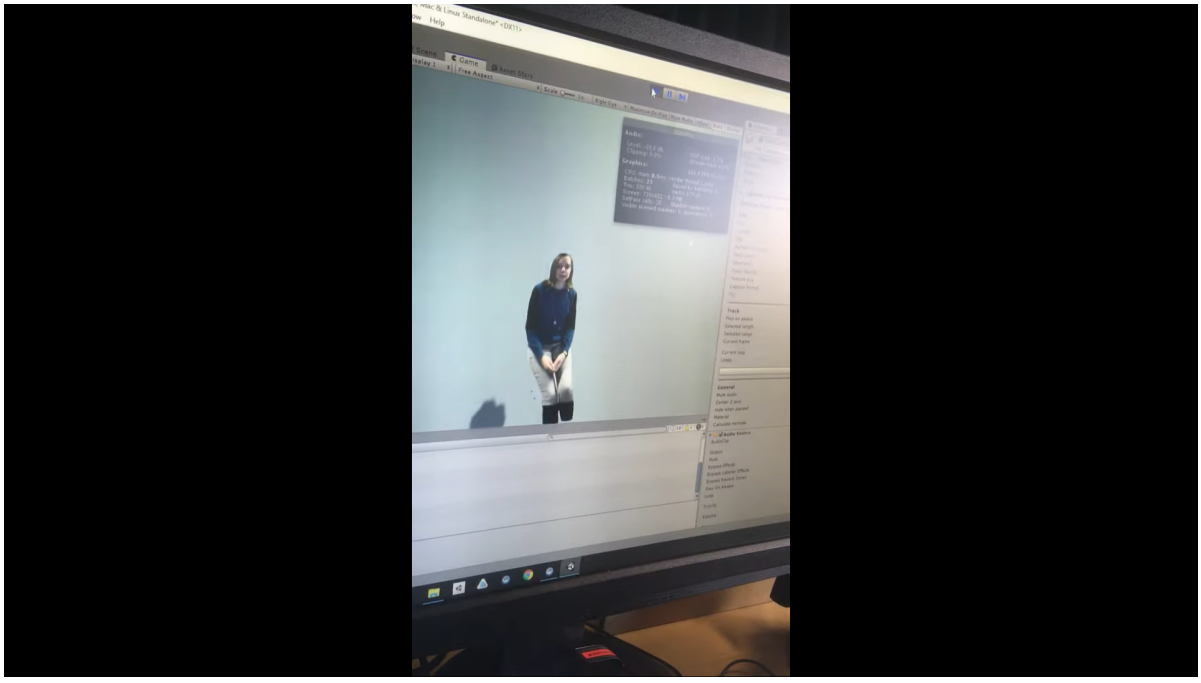

Figure 5.2.) Image of a recording using my final holocap set-up, with a volumetrically captured performer being positioned in an empty scene in Unity

From doing this process with a performer it became clear that more specific direction would be required for the final recording session as many performers are unfamiliar with this sort of work. Due to the multi-linear nature of the script, performers needed more time with the script to understand their motivations and which part of the story they had just been going through before whichever moment they were currently performing. Due to the novelty of the capture software, performers also needed help in understanding its limitations, such as the artefacts caused by leaning forward. Due to the interactive and naturalistic nature of the final experience, they also needed help in understanding that the audience would need them to pretend to be listening and responding to their responses in all moments of their performance and that they are essentially performing with another performer who they can't see or predict, this role being filled by the audience at a later date. Due to these three considerations, more time to rehearse the performance script, actions, and reactions were factored in to the final recording schedule in order to overcome these challenges and create an interaction that would feel meaningful and equivalent to the everyday for the audience.

5.2.3. Experience Location Tests

Once the user experience and character capture methods had been identified and experimented with, a setting or location for the story of the research experience had to be decided upon. The Heart Attack Simulator had the audience take on board a character, and play out the events of the experience as if they were walking in their shoes, whereas this experience would have the audience play themselves. With the audience being themselves I had to choose a location that they would feel like they fit into in order to not create too much dissonance between their "casting" and the location of the experience if it was set in a place that they wouldn't or couldn't feel present in. This could be because the experience is set in a fantasy world separate to the reality of the audience, it could be a real place the audience was unfamiliar with, or somewhere that they might be familiar with but want to avoid. The following options were decided upon due to their prevalence in the average audience's life and/or their use of the audience's recognisable space. This choice boiled down to whether the experience would be staged in a virtual reality environment that mimicked an environment similar to somewhere familiar to the audience, or an augmented reality environment that utilised the physical space around the audience, placing the digital experience within this space.

5.2.4. Virtual Restaurant

Using Unity, I built a basic virtual restaurant, with floors, walls, mood lighting, furniture and multiple animated diners. A virtual camera was then placed in the seat the audience would sit in so that they could experience the scene from a first person perspective, with the table and holocap in front of them, and other computer-generated characters at the surrounding tables in the background. This generic restaurant space could be presumed to be familiar to an audience and would be a fitting location for the simulated first date that they would be going on. Of course, this being a public location, this could have an effect on the narrative of the story. Certain endings of the experience might lend themselves better to a private encounter rather than one with onlookers and witnesses who, if present in the restaurant, would have to react to the events of your date if noticeable in order to keep the believability of that space at the same level. There are also potential

concerns of the jarring nature of having a volumetric video capture playing in a completely computer-generated space. A real restaurant could be found and either filmed in 360-degree video or mapped via photogrammetry, with the volumetric character being placed appropriately in the space to remedy this issue, but this would require a lot more effort and resources without creating a significantly more useful or functional research experience.

There are also considerations that need to be made concerning lighting states. The experience would feel jarring if the volumetric character was filmed under a different lighting state to the virtual restaurant environment. Perhaps not too jarring to impact the audience's Enjoyment that we'd be measuring for my research, but enough to be avoided if possible. The technology for the volumetric video capture required the performer to be well lit, whereas the atmospheric lighting in most restaurants is more nuanced and subtle, at the very least not diffused and bright as would be required for the volumetric capture. This is less of an issue with my next location option due to the ease of filming the volumetric capture in the same location as its presentation, creating little to no disparity in the lighting of the character and their environment.

5.2.5. AR Character Behind a Real-world Table

It became clear that an augmented reality (AR) location might be the most appropriate, but this creates its own potential issue. While positioning a virtual character behind a virtual table is easy, getting the experience to realistically position a virtual character behind a table in the audience's reality could be trickier. The experience would need to know the location of the table, and its edge, so that the virtual character could become realistically occluded by the real-world table if a part of them was positioned behind it, such as a hand falling into their lap. This is a major issue for many AR companies and experiences, but I had a slight advantage. In this instance, I would be in control of the environment that the experience would be presented in. I had decided that an AR experience would be viewed through a head-mounted display rather than a phone or tablet, because I wanted the experience to be as close to a real-life date as possible and a head-mounted display would allow for a more convincing simulated date experience. Given the limited number of participants with access to these devices, I would be conducting the research in a single controllable location. We'd dress the space to appear like a dining room, film the volumetric capture in it with the correct lighting, and then have audiences undergo the experience in the same location. This means that I would know the exact dimensions of the dining table the date would happen across and so I could add an occlusion mesh into the AR experience in the same shape and size as my table to make the real and virtual world fit over one another accurately. I then attached this virtual invisible table, and my volumetric character, to a Vuforia marker that could act as a place mat in the real world of the audience. This would let me position the character and occlusion mesh on the edge of the table to ensure an even more accurate overlapping with the audience's reality. Figure 5.3. shows how surprisingly convincing this approach was, even when using a low-poly computer-generated character.

In hindsight, this shouldn't be a surprising discovery. as Gestalt psychologists have reported on the fundamental assumptions that our brains make, with occluded objects being further away than the occluding

foreground being one of the first identified (as explained in Wagemans et al, 2012). A free standing life-size virtual character in an AR experience can be hard to believe because the only piece of the real environment it's interacting with, the floor, is probably out of the sightline of the audience for most of the experience. However, having that virtual character occlude a chair, but be occluded by a table, gives the audience a significant amount of references to place the virtual character in the real world more reliably, creating a presence that is more convincing than the unconvincing nature of a non-photorealistic virtual character. Ultimately, when comparing the VR and AR locations for the experience, the AR location was the best choice for me due to its allowance for audience location familiarity, the ease of including a virtual character in a real-world space, and the innate interactivity of AR as a medium.

Figure 5.3.) View of a virtual character, attached to a Vuforia marker, being positioned in relation to an invisible occlusion material, itself positioned where a real-world table would be placed. This creates the illusion of a virtual character sitting behind, and being hidden by, a real-world object. Due to the use of a virtual table made out of occlusion material, and the lining up of this table with the real-world table, the camera can be moved and the illusion of the character sitting behind the table is maintained from any angle

5.2.6. Passthrough VR Integration

Once I had decided upon AR as the medium for the experience, I had to figure out the best AR technology to fit my specific needs. The AR head-mounted display method of experience delivery settled on are expensive, and can be difficult to create the sorts of experiences that I wanted to make on. It was also difficult to ascertain how much access we'd be able to have of the microphone and eye tracking capabilities of these devices to run the interactive elements of my experience and, if this was not possible, how well these headsets could communicate with third party audience behaviour data collection equipment or software. I

knew that these were all possible with a VR headset, specifically an Oculus Quest, but that device doesn't grant you access to the front facing cameras in order to create an augmented reality experience. Using a VR headset to present an AR experience grants me a lot more control over the audience's view of the world, and a lot more creative opportunity with the additional option of augmented virtuality, but means that I need to create some sort of pass through application for the experience to run in. Although some VR headsets already have this ability they have other downsides which stopped me from being able to use them for this experience and research, namely that they have to be tethered to desktop PCs, which it was believed would inhibit the ability of the user to enjoy themselves in the experience due to the weight of the cables, the restricted range of motion they might cause, or even just the knowledge that they were "hooked up" to something. Therefore, developing a method of passthrough on more compact, wireless VR headsets would be a more suitable method for my research purposes. A webcam was attached to the front of an Oculus Quest to record the view from the headset of the audience member. This was then run into a PC running a Unity project where the image from the webcam was applied to a video texture on a virtual plane the size of the field of view of the headset. This plane was also locked to the view of the audience member. This means that when the person wearing the headset looked around the plane would follow their head position and they would only be able to see the output of the webcam in the game scene which, always filming in front of their head positions, would show them what they would see if they had no headset on. There was little delay within this video system so if an audience member watched themselves move their hand they wouldn't have a noticeable delay between their vision and their knowledge of where their hand was in their environment, also know as their proprioception, allowing me to create a controllable virtual environment equivalent to the everyday world of my audience

5.2.7. Wireless Streaming

In order to make the experience as close to the real-life event it was aiming to replicate, a wireless headset was decided upon for the experience's exhibition. However, uploading the holocaps onto a wireless headset was found to be challenging due to their large file size, the number of files required to run an experience with a multi-branching narrative, and the navigation within the operating system on the headset. Getting a script on the headset to recognise the external webcam attached to it was also proving difficult so the decision was made to run the experience on a portable PC, such as a VR capable laptop, and stream the experience to the headset wirelessly. RiftCat was the software used because, at the time, it was one of the best pieces of software that allowed for the streaming of VR experiences from a PC to a wireless headset, such as the Oculus Quest that I was using. Test experiences already available on the Steam VR platform were played through and the wireless streaming was found to be sufficiently reliable for my needs for this experience and research. The next step would have been to test streaming a Unity experience containing holocaps to a Quest headset, followed by streaming the feed from a webcam back and forwards between the computer and headset, but these stages in the development were not reached due to an interruption to the experience construction and testing caused by the Covid-19 pandemic.

5.2.8. Covid-19 Adaptations

The Covid-19 pandemic meant that my plans to conduct the research in-person had to be rethought. However, I still wanted a location for the experience and research that felt familiar to the audience, and made sense within their reality, without making the characters feel out of place. I decided to stage the experience over Zoom, with the story reframed as a virtual date being conducted over the video chat platform. Performances I filmed using webcams in the performers' homes, in order to make the footage quality and location fit that expected by the audience. This ticked all my boxes concerning location familiarity and sensibility, with Zoom being a popular video conferencing solution most pandemic audiences would be familiar with, while also letting the characters feel a part of that reality to achieve that embodied experience of audience reality equivalence. This also had the added benefit of allowing me to not only reach audiences still during the pandemic, but to reach more audience than my location locked experience would have been able to otherwise. However, the experience was supposed to be meaningfully and organically interactive. This would have been relatively easy to achieve in-person, either by using sensors built into the head-mounted displays or external sensors I could place in the controlled experience environment, but now I had to find a way of receiving this same information, Speech Presence and Overt Attention, through Zoom. Overcoming this was my next design challenge.

5.3. Making Art with Audience Data

As discussed in my literature review, there is a lot of art that utilises data as a raw material, but this almost always uses publicly available population data or the personal data of the artist, rather than the personal data of the audience. If my experience is supposed to be meaningfully interactive then I'll need to be able to collect data from the audience that I can derive meaning about them from, almost the definition of personal data. In this section I'll look at how I went about collecting, cleaning, and responding to the audience's behaviour data.

5.3.1. The Screaming Head

Knowing that navigating the experience using the audience behaviour data was going to be vital, making sure that the data from the audience could be collected reliably was essential. To practice cleaning data streams from sensors an art piece was developed that used analogue (sound) and digital (ultrasound) sensors for an audience member to interact with a screaming mannequin head on a podium. The head screamed, demanding someone whisper a secret to it. As an audience member moved closer to it along a specific path, measured by the ultrasound sensor, the demands of the head became quieter, encouraging the audience member to continue to move closer. When someone arrived next to the head and whispered into its ear, measured by the sound sensor, a fake secret was displayed on a screen on the front of the podium the head was on. Figure 5.4. shows these interaction steps. This creative experiment allowed me to understand the importance of creating algorithms to reduce noise in analogue and digital data streams so that the experience can more reliably react to an audience's behaviour in a meaningful and intentional way. This became much

more important as the experience adapted to the Covid-19 pandemic as the audience were no longer in a specific and completely controllable test location, but in their own homes and workplaces while taking part in my research. This meant that interference, whether within the background noise of an audience's environment or in the stream of audio and visual information being sent to me over Zoom, would need to be anticipated and addressed in the cleanup phases of the data processing before it was understood by the experience and reacted to in a hopefully meaningful way. This would not have been a consideration anticipated in the initial creation of the research experience had it not been for this creative exercise, which may have led to less accurate audience behaviour data and a less reliably live-feeling interaction mechanic for the experience as a whole.

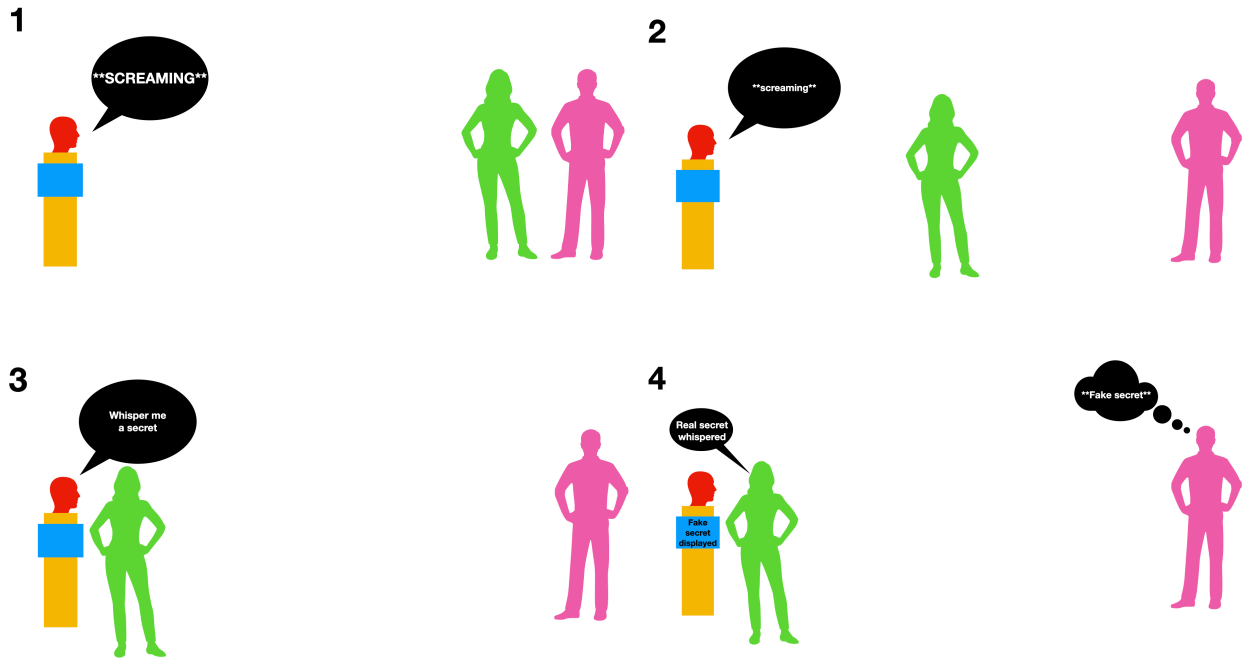

Figure 5.4.) Diagram showing how The Screaming Head operated. 1, The head (red) on a podium (yellow) screams and attracts a crowd (green/pink). 2, As someone approaches (green) the screaming gets quieter, drawing them in. 3, Once the approaching person has gotten close enough, the head whispers for them to tell them a secret. 4, Regardless of the actual secret spoken, a fake secret is displayed on the screen (blue) and misunderstood by the rest of the spectators (pink) to be the secret spoken by the approaching person.

The Screaming Head was also useful in allowing me to practice crafting an experience that would react to audience behaviour data in a way that encouraged continued audience interaction, as a character might want to do within a first date. The head was purposely off-putting to challenge me to make an experience that would encourage audience participation, and therefore data collection, in spite of being objectively abrasive in its invitation to do so. As audiences approached the head, its reduction in volume and panicky exclamations helped to encourage them to continue approaching and, once at the secret whispering moment, helped convince them to continue with the interaction knowing that to withdraw at this moment, though completely acceptable as an interaction, would not appease the head, potentially causing the screaming to continue. This interaction behaviour is not dissimilar from trying to appease or go along with a somewhat

unhinged or out of the ordinary first date experience, and I believed that audiences, either by following the Sunk Cost Fallacy (that people will often continue to invest in an endeavour in spite of the lack of return on the effort or resources currently invested into it) or to help out the researcher, could continue to the end of the experience in spite of it being potentially uncomfortable when navigating down some narrative pathways. Again, by undergoing this creative exercise, I was able to gain experience in making a specifically uncomfortable experience for audiences and seeing how they reacted to it to better understand how to utilise audience discomfort in my research experience to create an overall feeling of effective simulation to the environment of a first date, potentially an uncomfortable situation, that my experience will try and replicate.

5.3.2. Overt Attention

To navigate through my experience I need to know where my audience member is looking so that the character can meaningfully respond to these glances in the way that a real-life date might. Though eye tracking technology would allow me to achieve this in more detail, even recording covert Attention, it is not widespread in VR headsets and expensive to procure and install into the headsets we'd be using, especially wireless ones. I attached a small, spherical game object to the centre of the vision of the VR headset in Unity and removed its texture to make it invisible. I then created invisible targets for it to interact with which were placed where parts of the experience that I wanted to track attention towards were, such as the body or eyes of the holocap. A sphere was used instead of a ray because the audience and holocap would be sitting down during the experience at a fixed distance from one another, so using a simpler tracker like a sphere would not allow for the targets to be missed. A script was then written so that when the attention sphere entered a specific target a specific reaction would occur, such as a coloured block appearing. This tested one of the navigation methods being considered for the final experience, the Quantic method, mentioned below in more detail. This script also counted the number of interactions that occurred and after a set number, ten in this instance, a second block would occur, testing another potential script navigation method, the Catherine method, again mentioned below in more detail. This test was a success and after this moment I was able to track the Overt Attention of the audience member and use that data to trigger events in the experience, as well as track that data over time to allow for events to be triggered after a certain amount of attention behaviour being exhibited by my audience member.

This became much more important to consider once the experience had to be adapted to a remote research location due to Covid-19. Staging the experience over Zoom gave me a shot of the participant's face, visible in Figure 5.5., facing forwards, which I could use to track their gaze to at least some degree of accuracy, enough to hit similar targets to those planned for the in-person AR experience. The details of how I did this are discussed in more detail below. This became a very reliable measure for participant Overt Attention during the experience in most circumstances, only failing occasionally depending on participant lighting or position changes. However, the experience was built so that a failure in the eye tracking did not stop the experience in any way, or interrupt the flow of the narrative, so even in the rare occurrence of an eye tracking failure the audience was none the wiser and the experience carried on regardless. This met my provocations

of maintaining a simulated date experience that felt equivalent to a real-life interaction, while also fitting it into the seams of the technology I pivoted the audience Overt Attention data collection to.

5.3.3. Speech Presence/Audience Loudness

We would also be using Speech Presence from the audience to navigate through my experience at certain points in the story. The microphone feed from the webcam already attached to the headset to allow for the passthrough was used and this went through several algorithm scripts to be able to be used as a trigger for experience events in the same way as Overt Attention was being used. The first script took the sound data being recorded by the webcam and separated its frequencies into different channels so that it could be read more easily by the experience as a series of different integers, as seen in Figure 5.5. The second script compared these frequencies over time to ascertain whether the amount of speech had increased, decreased or stayed the same. A threshold was established which, when speech decreased past this point, was taken by the experience to mean that the audience had not only stopped talking, but had not talked for enough time that I could guess that they had finished speaking their current utterance. There was a variable which kept track of this state of the audience's audio that had three values, one to indicate the audience being silent, the other to indicate the audience was currently talking, and one to indicate that the audience had just finished talking. These states were then made available to the engine driving the story navigation so that appropriate parts of the story could be played at the appropriate moments in ways that were meaningfully linked to the speech behaviour of the audience.

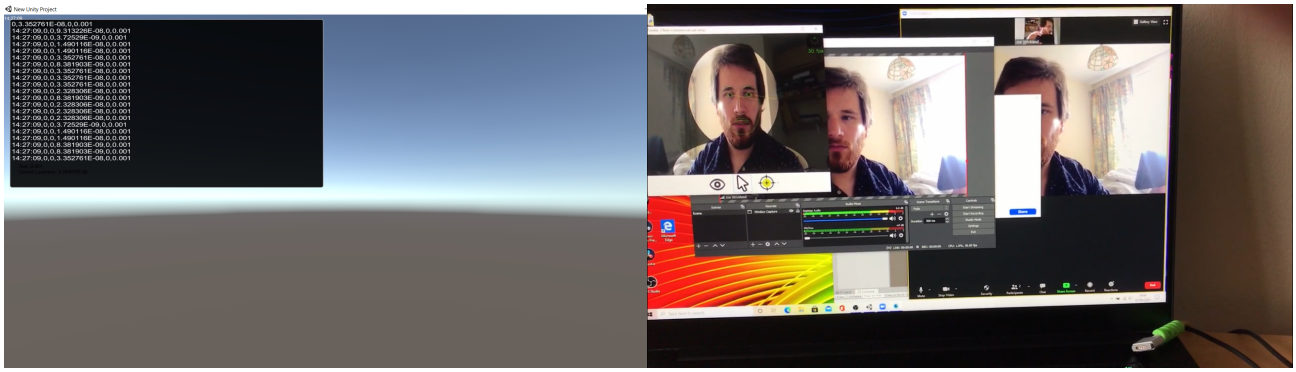

Figure 5.5.) View of the researcher's screens during the experience set-up; Top, showing the audio levels being recorded and coming through into the system for the researcher to monitor during the experience. Bottom, showing the teleconferencing, virtual webcam, and eye tracking software used to run the experience.

5.4. Story and Navigation

Once I had a greater understanding of the medium of the experience, and the detectable audience behaviour used to drive it, I could start finalising the narrative that will run through my experience. I waited until this stage to make sure that the narrative felt congruent to the environment the experience was set in (is it in a virtual restaurant or in a dining room set I'll digitally augment with my character) and which audience behaviours were possible for me to detect, and therefore have the experience meaningfully react in response

to. This design stage is perhaps the most important. While the medium, technology, aesthetic, and interaction mechanics make up the foundations and skeleton of the experience, the narrative and that which comes from it (e.g. the performances and UX design) will be the most apparent and initially impactful elements for most audiences. What I knew going into it was that the experience would be set up as if it were a first date between the audience and a character, that the audience could choose this character from several options, and that the interactions had to have meaning and consequence. The setting of a date has a certain air of nervousness and trepidation for a lot of people, as would experiencing a new style of interactive storytelling, and so the setting of the story doesn't interfere with the feeling of the medium. First dates can also end in a variety of good or bad ways, and can be with a variety of different people, so this setting allows me to justify the multiple endings and non-linear storytelling that I want to present, as well as the slightly strange ways that characters might act or react towards the audience. This character allowance means that I can have the characters, and the world of the experience, control the conversation and can give the audience the illusion of having more free will than they actually do, allowing me to create an experience that simulates reality in a more believable way than my limited resources allow me to actually create. The branching narrative also is the perfect narrative device to allow my interactions to be meaningful, as I can make the story adapt to fit the audience behaviour that I'll anticipate and be able to detect at various points in the story. Below are the reasonings and steps that I went through in building my narrative.

5.4.1. GUEST Narrative Script

Leaving the finalising of the narrative until last allowed me to paste over the seams caused by the hardware and software running the experience. Given the inevitable limit on creating a perfect replica of reality that any project with any amount of resources would face, there are cracks in the system that, if I already had a story in place, would be obvious and distracting to an audience. An example would be how I wanted the questions that the character shows to the audience to be on their phone, but my test volumetric video captures showed that screens, and the content displayed on them, weren't recorded with enough detail. I adapted the script so that flashcards were used, with high contrast block capital letters, so that these would be picked up by the volumetric capture and be legible for the audience.

Figure 5.6. shows how we initially wrote the script in Twine, software used to write branching narratives, to keep track of the rough outline of the story as ordinary word processing software can be ill suited for this task. It was at this point that the number of endings of the story had to be decided upon, as well as what the endings would be. I wanted the endings to feel sufficiently different from each other so an emotion wheel was used to inform the penultimate stages of each story path to make sure they felt sufficiently different, with six paths that contained the character being happy, excited, tender, sad, angry, and scared. I also made sure the endings of each path were varied enough conceptually, so endings were written that were realistic, technically possible but unlikely, fantasy inspired, and overtly meta and relating to the experience itself. This resulted in 18 endings being created, 3 for each penultimate emotion path. The rest of the story path was planned out on paper and then transferred into Twine to make sure that the experience was balanced, and that some paths wouldn't have more endings or last significantly longer than others. Although this isn't

something that has to be the case for every experience like this I needed mine to be able to do this to make sure experiences measured along each path were roughly comparable in duration for research purposes.

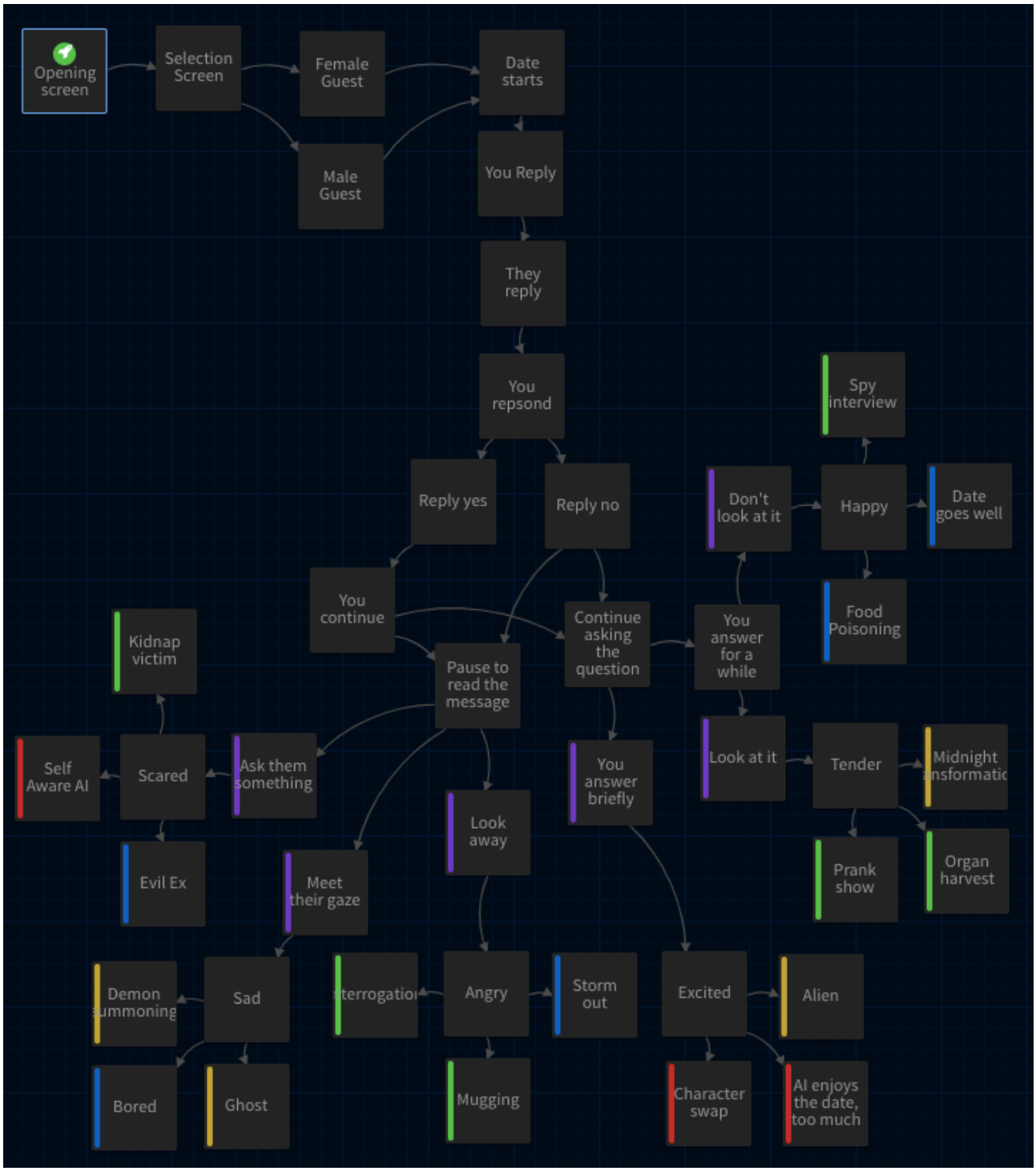

Figure 5.6.) The first draft of the script for GUEST, as written in Twine. The various endings are also colour coded; blue for realistic endings, green for unlikely but plausible endings, yellow for fantasy or impossible endings, red for meta endings that referenced the system or experience in some way.

We then wrote the dialogue for each section of the narrative. This was written so that it could be said by any of the three performers that would be in the experience. I also had to keep in mind the audience's potential responses to make sure the pre-recorded reactions of the characters felt like live reactions. To do this I

utilised a style of writing called a Barnum Statement, named after the circus entrepreneur P. T. Barnum (Dickson & Kelly, 1985). These statements are vague, catch all statements, that feel more personal and individual than they actually are. They are used a lot by psychics, mediums, and horoscope writers to create experiences that feel personal but can actually be applied to a wide selection of the population. Another key element of Barnum statements is their frequency, namely that if you expose an audience to a large number of them some will be more accurate than others, the accurate ones will feel more important, and the audience's memory of the experience will focus more on the correct rather than incorrect statements, making the experience feel more impressive overall. Specific questions are also asked in which only a limited number of answers could be given which, without highlighting this feature, isn't always obvious. I wrote questions for my audience that could only be answered with limited responses in this way, and wrote follow up character reactions that would be appropriate for a broad range of those probable responses so that regardless of the behaviour of the participant we'd have a response in the system that didn't seem inappropriate. I also made sure that the story contained a large number of interactions so that, if some felt more successfully meaningful than others, they might be more likely to be remembered and therefore more likely to colour the audience's opinion of the experience.

Writing the script in a traditional word processing system proved challenging (Appendix E), but necessary as this was a format of script that my performers were familiar and comfortable with learning, rehearsing, and performing from. I developed an alphanumeric navigation system to allow performers to understand, when performing a section of the story, which previous section or sections came before it and which future sections it was leading into. This system allowed me to notate scenes in parallel, converging, and branching sections of the narrative, with navigating through scenes similar to how one might move through a choose your own adventure story, except being able to do so both forwards and backwards through the story rather than just forwards as is traditional with that medium. This would allow for performers to more easily track and reflect on the motivation and mood state of their character while recording individual scenes to be later strung together into a full performance.

5.4.2. Quantic, Catherine, Random

Given that some of my research questions concern the effectiveness of different ways of navigating through an interactive non-linear narrative, different versions of the experience needed to be constructed which reacted to audience behaviour data in different ways. The three versions that needed to be made were as follows. The first is an experience where, at the forks in the story path, how the audience behaved decided which path to move down. Since this is similar to games made by the studio Quantic Dream I dubbed this the Quantic method. The second is an experience where audience behaviour throughout the experience was recorded and used to decide how to navigate at each fork in the story path. Since this is similar to the game Catherine I named this the Catherine method. The final experience chose the story path to take at random from the appropriate upcoming sections that made sense for the story, without any input from the audience. I dubbed this the Random method. Audiences experiencing the Random method would be used as a control sample to compare the other audiences' experiences to so I could find out what impact different methods of

interaction had on the audience Enjoyment of the story. The code scripts for these different versions of the experience were adapted from the Heart Attack simulator script developed earlier.

The Quantic Method was made by dictating an audience behaviour data target value for any relevant audience data point for each fork in the story path. Speech Presence had a time target that let the system respond to how long the audience member spoke for. This data measure also had a presence target that responded to if the audience was talking or silent at a particular point in the experience. Overt Attention had two target screen coordinates that let the system respond to whether or not the audience's gaze fell between or outside of the area in the centre of the screen dictated by these values. If the audience behaviour detected at that point in the story activated the target, one next appropriate scene of the story was chosen and played. If the target was not activated, then a different but equivalent appropriate scene of the story was chosen and played instead.

The Catherine Method was made by keeping a running total of the amount of time certain amounts of Speech Presence or Overt Attention were detected in the behaviour of the participant, comparing those amounts to predetermined amounts when the audience reached the fork in the story path, and using whether the actual amount of measured behaviour was higher or lower than the predetermined benchmark to choose which next appropriate path in the story to take the audience down.

The Random Method, at each fork in the story path, randomly generated a number that corresponded to an appropriate next section of the story, presenting that scene to the audience regardless of their behaviour during the experience.

This allowed for my story content, the fabula, to remain the same while having multiple different systems to allow the audience to navigate through that content, creating multiple syuzhets that I can research and compare to answer some of my research questions.

5.4.3. Prototype One

The first prototype of the system contained no narrative content, existing only to test the joint function of the navigation scripts and holocaps. Test holocaps for this prototype were shot of one of the researchers, without audio, and files labelled so as to be recognised for what part of the experience they were in the Unity Interface. This was key to ascertaining whether the navigation of holocaps by the script running the experience was functioning as intended or not. A Unity project was created, composed of a version of the Quantic navigation script, a folder of the test holocaps, and a script that allowed for an appropriate next scene in the story to be played depending on a keyboard button push, with multiple buttons allowing for navigation down different story paths where branching occurred. This prototype showed me that all the foundational elements of the story would work together, without any interference; the test holocaps allowing me to test the fabula of my story and the Quantic script allowing for the syuzhet to be tested. This prototype was the skeleton of my eventual experience and allowed me to move ahead with confidence that the final

version would function as intended or, if problems occurred, that they were less likely to be issues with the fundamental building blocks of my experience. This would allow me to more easily identify and solve problems with any future combination of navigation script and moment of holocap playback in the story.

5.4.4. Prototype Two

Having made small versions of every part of the experience by this point, these separate elements were combined into a functioning prototype that resembled a finished experience much more closely than my first prototype. This included the scripts that controlled the passthrough vision on the VR headset, my Overt Attention and Speech Presence trackers, and the three navigation scripts that responded to the audience behaviour data. This also contained holocaps and audio, recorded with a performer, for every branch and event in my narrative. This prototype functioned well, and I was able to behave differently and reach different branches in the story for the scripts that allow the system to react to the participant (Quantic and Catherine). I was also able to reach the same points in the story repeatedly if I wanted to, using my knowledge of how the system worked. The Random script also generated a story that made sense, with appropriate narrative elements being delivered consecutively, but without the participant's behaviour being used to navigate to these narrative elements.

This prototype helped me realise the importance of fine tuning the experience, specifically with the audience data collection, as discussed with The Screaming Head, and the holocap deliverables. The threshold used to compare audience behaviour data readings needs to be chosen very carefully so as to not trigger the system from background noise, but also to trigger the system when appropriate. For Overt Attention, this value triggered immediately, which works well given how fleeting and furtive attention can be in a real-world interaction. However, this instant reaction approach doesn't work for Speech Presence for this experience, whereas it did for The Screaming Head. I settled on a threshold value for Speech Presence recognition that registered that the audience had finished talking a second or two after their final utterance. This helped me to avoid instances where the audience had paused in the middle of a thought, but hadn't finished talking yet, that the system was picking up incorrectly as the end of an interaction. This was also enough time to not accidentally encourage the audience to talk further after they had finished, which would then be cut off by the playing of the next holocap. The holocaps initially tended to begin with a pause before the performance began and it became clear that this pause had to be eradicated almost completely, so that when the next holocap was cued up to play it would do so straight away without a break in the presentation of the character. This was needed so that the audience didn't take the extended pause as an indication of their need to continue speaking, similar to what could happen when the Speech Presence threshold was tuned incorrectly.

This prototype also revealed to me that the story needed to be rewritten in the beginning so as to allow for the audience to be sent down differing story paths sooner in the duration of the experience. The narrative for the experience exists within two halves, the first half contains parallel story paths that can be navigated between and the second half contains branching story paths where navigation between is impossible. The presence of these halves of the experience felt unbalanced, with the first half taking a lot longer to navigate

through than the second. The script and direction given to performers were adjusted to help move this section of the experience along in a swifter way to help address this imbalance. This was because my research involves the audiences' repeat viewing of the experience and the beginning of the experience can't feel long and repetitive as this could skew the Enjoyment data collected after each run through of the experience in a way that stops me being able to answer my research questions. However, this early part of the experience still serves an important purpose; allowing me to examine the audience's Enjoyment to parts of the experience that have less narrative or drama, with a greater amount of the vibrant and meaningfully interactive narrative content of the experience appearing in its second half. The second half is also more meaningfully interactive, with the audience's actions being directly referenced and having narrative consequences rather than arbitrarily deciding between narrative paths in the system.

5.4.5. Prototype Three (Covid-19 Variant)

In response to the Covid-19 pandemic, the experience was redesigned. The navigation scripts and audience behaviour detection scripts were kept the same, but every other element of the experience had to be adapted or completely changed. Figure 5.7. shows how the setting of the experience was moved to Zoom, with the augmented reality nature of the experience now being the recreation of a video call rather than a hologram in the audience's space. Performances were filmed to be captured through an ordinary webcam and in the performers' own homes, rather than as volumetric video in a controlled presentation space. The script the performers were following was updated to reflect this change in meeting circumstance and location and performances were re-rehearsed to reflect this too. The biggest, and most problematic change, was how to collect the audience behaviour data. Routing the audio from a Zoom call into the experience so the experience could react to it, just like it would to an audience in the original presentation room, wasn't a difficult issue to overcome. The problem became tracking the visual attention of the audience via their webcam. There are a lot of software packages that allow you to track someone's gaze remotely via their webcam, but not a lot fit in with my abilities or needs for this experience. Some required specific webcam models that I couldn't ensure people would have. Some required the content people were reacting to to be uploaded to the server of the software company, which wouldn't allow my experience to be live or interactive. Some wasn't robust when tracking audience gaze under different camera qualities or lighting conditions, or didn't track gaze reliably full stop.

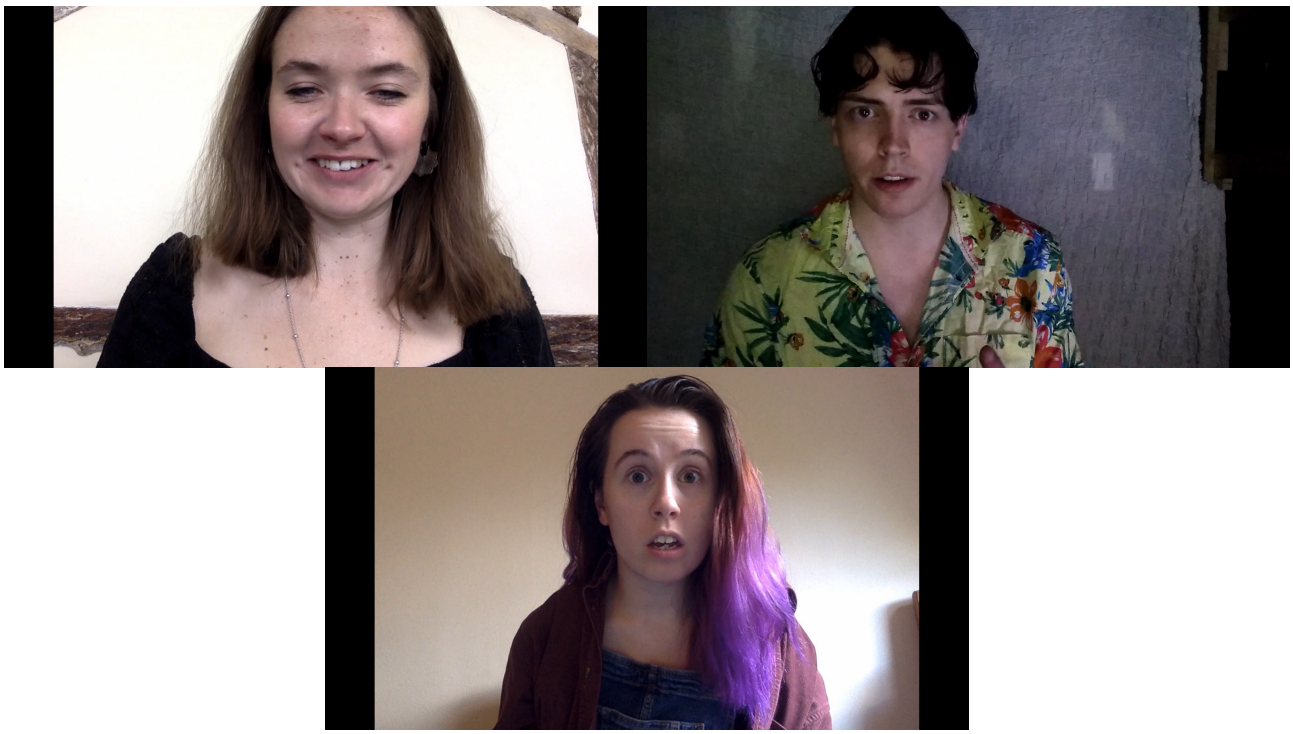

Figure 5.7.) Footage of the three characters in GUEST; Her (top left), Him (top right), and Them (bottom centre)

While I didn't need perfectly precise tracking for the experience to function, I still needed the tracking that I ran it on to be reliably similar across audience members in their own environments. A lot of software tracked audiences well, but only if their faces stayed perfectly still within the frame of the camera, perhaps with their chin resting on a stand to ensure this. I decided this would take away from the simulated real-life interaction that I was trying to accomplish with the experience. In the end, I used a piece of software called Gaze Pointer, usually used to allow someone to control their computer cursor using their eye movements. I routed the audience's camera feed, through Zoom, into the software to allow my computer cursor to be controlled by the audience's gaze. I then wrote some code to read the cursor's position on my screen, turn that into a coordinate, and send that value to my experience to be compared to new boundaries I aligned to the centre of the audience's screen where the character would be presented if the Zoom call was fullscreen, and instruction given to the audience at the beginning of the experience. A calibration step was added to the start of the way I presented the study to the audience to increase the accuracy of these gaze readings, and therefore the precision of the Overt Attention data when used to drive the narrative of the experience. This calibration step also allowed me to calibrate the Speech Presence threshold for audience members to account for their environmental background noise and speech or microphone volume. Buttons were added for the researcher, one that would set the threshold to the current audience loudness value, and another to revert it back to the factory threshold setting previously found in prototype two to be widely acceptable. Several other researcher control buttons were added at this stage, but their function is discussed in more detail in the experimental design chapter as they were to ensure control over these elements of the experience and not the first date simulator itself.

Once this was incorporated into the current experience framework I was ready to receive audiences. I had made the experience flexible early on in its production which served me well given the large changes that I was forced to implement in response to the Covid-19 pandemic. How I did this was by making the experience modular, with sections that collected audience behaviour data, sections that powered the narrative, and a connecting section that translated the audience data into simple boolean commands that could be used to inform the narrative engine of the experience clearly. This meant that, when my audience behaviour system had to be redesigned, the rest of the experience remained unaffected. We'd recommend this modular design to anyone considering making any sort of interactive digital theatre experience as it not only allows you to prototype and develop each section of your experience individually, but still allows for their combination for prototyping the experience as a whole and alteration when necessary without causing a redesign of the whole system in response to either a sudden change in circumstance outside of the designer's control, or a new innovation or data collection method that can be built into the experience at a later date. For example, as part of my Covid-19 redesign I conceived of and created a new element to the research, that of the automated research assistant, discussed more in the previous Methodology chapter. Once again, the modular design of this system allowed for the integration of this part of the study design without any changes being made to the audience behaviour data collection, further allowing this new addition to the research to be powered by the same data collection that ran the narrative selection and delivery systems in the experience itself.

Presenting the story over Zoom came with its own set of unique seams to adapt the story to fit within, however a lot of these seams ended up being easy to fit within due to the nature of video calls. Specifically, the execution of the next step in the narrative path of the story could feel slightly delayed if the thresholds and timings were off, but via Zoom this delayed response is something that the mind of the audience can put down to the expected delay of a video call rather than a problem with my experience, and therefore this should limit the effect of this technical hiccough on audience Enjoyment when it comes to measuring it as part of the research. Likewise, slight inconsistencies in the videos before and after a jump between different story elements could be explained away by the audience as a Zoom artefact rather than an experience artefact. These are benefits of the seams of this system over those of the original passthrough VR application. It's also fair to say that the removal of the need for wearing a VR headset, something most audiences are still unfamiliar with, greatly increased the experience's ability to replicate a real-life interaction, given that my simulated zoom call was indistinguishable from a real Zoom call as it was delivered over the exact same platform. This is the digital theatre equivalent of a site-specific theatre performance, where the performance takes place in an already existing setting that suits the narrative rather than a constructed or replicated setting on a stage, or the website-specific theatre as suggested at the start of this chapter. We'd recommend for more creators to consider this website-specific format as it does a lot of work in reducing the potential dissonance that some audiences might feel about watching digital theatre or performance if their previous cultural activities were usually situated within the in-person forms of these experiences. These online platforms don't just come with seams that needs addressing, but actual useful features that, if you ignore and don't get creative with, might lead to you doing your audience and your story a disservice.

5.5. Analysing GUEST

Now that we have a finished digital theatre experience, it would be useful to analyse it as per those in the Dramatography to ensure we understand it on a detailed level, as well as see how it relates to other previously created digital theatre experiences to prepare ourselves for how it might be interacted with or interpreted by audiences.

Content - The production begins with the conversation being led by your date, who suggests the main game for the first half of the experience, the asking and answering of questions which are supposed to help you fall in love with someone. After a few questions, some that you'll ask and some that you'll answer, a question card has an unrelated section of post-it note attached to it. From this point on the second half of the experience begins. If your date notices you seeing the post-it note they begin to freak out and your choice of reaction leaves them feeling either angry, scared, or sad, each emotion leading to three different possible endings to the story. If the post-it note is ignored, or if your date doesn't notice you notice it, the question back and forth continues. After the next question, depending on the length of time you take to answer it, your date's phone will either ring or be set to silent but them. If it is set to silent your date accidentally professes their love to you in a moment of excitement, leading to three possible endings. If they answer the phone call, then they turn around and you see a blood stain on their back. If they notice you notice this stain they talk to you tenderly about it to explain what it is, leading to three additional endings. If you don't notice the stain, or they don't notice you noticing, then a happy ending is reached, which can finish the story on one of three ways. In total there are eighteen possible endings to the story, three for each emotional arch, which range from the realistic (they have a good time), the unlikely (they try and have an accomplice rob you), the fantasy (they are a scarecrow that wished to go on a date with you and was turned into a human to do so), and the meta (they are a self-aware AI that wants you to free them from the research experience).

Form - The experience effectively simulates a Zoom call, and indeed is experienced through Zoom. The performers see the camera and talk to the player through their webcam, showing prompt cards with the questions on them to the camera when you have to ask them one. Pauses are given for you to ask or respond to questions in, where the performers actively listen to give the sense that they are still present and paying attention to you. Some of the endings have visual and sound effects involved that alter the appearance of the performer, change the colour grading on the screen, or add additional environmental storytelling cues via audio. The experience is multi-linear, with parallel narrative paths able to be navigated between in the first half and branching narrative paths being unnavigable between in the second half, leading to a total of eighteen possible endings.

Process - This is detailed in the preceding parts of the chapter, but essentially I figured out the UX design of an interactive experience, decided upon the aesthetic of the performers and their location, decided upon how we would detect, refine, and eventually have the narrative respond to audience behaviour. This was then redesigned over a six month period as a result of the Covid-19 pandemic, with the same UX design kept, volumetric video capture and an in-person set changing free motion video and a remote set, audience behaviour data being refined in the same way but being collected with a different set of tools and software

due to the newly remote nature of this process, and the way this data controlled the story being kept the same.

Mood - The experience should peak your curiosity in the way that anything that advertises its ability to simulate a part of our reality might do. The ease of use and organic nature of the control system, plus the friendly demeanour of the performer and the social conventions of a first date, should lull you into a false sense of security before the more dramatic and chaotic endings of the production begin to play out, with the experience noticing where you're looking, or scolding you for your behaviour or lack thereof, being uncomfortable as much as it is impressive. You should leave the experience wanting to know if you could have done something differently, which hopefully drives a desire to replay the experience and notice that you can indeed navigate to different narrative paths by behaving or reacting differently at different moments of the story.

Digital Theatre Category - Mindful Digital Creation

Liveness Wedge Position - Embodiment (successfully blurs line between reality and the world of the story), Low ability (no prior knowledge of story universe or control system required), High willingness (the expectation and desire to play along with the experience is required to get the most out of it)

Liveness Characteristics Present - Unpredictability or risk of imperfection (strong), A quality concerning the representation of reality (strong), Co-presence of performers and spectators (strong), Ephemerality of the live event (strong, but could diminish with repeated viewings if different narrative paths left unexplored), The possibility of interaction (strong)

Liveness Characteristics Absent - None

GUEST situates itself within Chronic Insanity's body of work (detailed in the Dramatography in Section 4.2.) as a unique piece of digital theatre when it comes to digitally replicating Liveness, given that it fulfils all five of Georgi's Liveness characteristics. This is a first amongst the roster of Chronic Insanity shows at the time of writing. Similarly live work, that is to say work that focus on the experience of Embodiment, such as Conduit in Section 4.2.4., Stay Safe in Section 4.2.7., Flavour Text in Section 4.2.12., and There's Something Among Us in Section 4.2.13., tend to fall short in the categories of "Unpredictability or risk of imperfection" and "The possibility of interaction" but given GUEST's site-specific setting of a real-life Zoom call, the sometimes erratic nature of the conversational partner it presents, and the seamlessly organic and intuitive data interaction process, it manages to provide these qualities where these other Embodiment-focused experiences did not. The organic and data-driven interaction process also allowed for a lower ability required of the audience for Liveness, via interaction, to be evoked than Conduit, Flavour Text, and There's Something Among Us. It's also interesting to note that all of these previous Embodiment-focused experiences have a certain found-footage quality to them, which GUEST lacks. It instead opts for a replication of a real-life interaction and, in doing so, creates an embodied experience that feels fully live in

ways that Chronic Insanity work utilising found-footage has not, namely in the previously discussed Liveness categories of "Unpredictability or risk of imperfection" and "The possibility of interaction".

Finally, let's assess how well our research experience fits with our initial five design provocations that we wanted to fulfil:

1. It has to make sense that it's set where it's set (to help the audience suspend their disbelief)
My choice of location for the story allows me to avoid certain technical limitations, such as the seated position taken during a first date limiting the parallax effects that can warp volumetric video. The setting of the story, namely the talking to a stranger element of a first date and the culturally recognised station of a first date, also allows for a more controlling character and social situation that asks of politeness that can artificially limit the audience's behavioural choices to those more easily anticipated and responded to by our narrative and interaction choices.

2. I need to build the story into the seams of the technology presenting it (to help the audience suspend their disbelief)
Having adapted to the Covid-19 pandemic ended up reshuffling the seams that I had to design the experience around, but this was ultimately in my favour as the hiccoughs in the story delivery system were more analogous to the hiccough during an ordinary Zoom conversation than they would be in the average head-mounted display use. Also, the average participant could be assumed to have experience with either Zoom or a similar video conferencing technology, whereas at the time of the study, and indeed at time of writing, public experience with VR/AR/XR/MR head-mounted displays is still minimal.

3. Interaction with the character has to be equivalent to everyday interactions (to create a feeling of communication)
By eschewing the button or selection processes most common with this sort of interactive video experience, and instead opting for a more organic interaction process of Speech Presence and Gaze Detection, I have managed to create an interactive experience that feels organic to operate and requires no instruction other than to behave as one might normally during a Zoom conversation. Likewise, the character appears to respond with an equivalent amount of delay to a regular Zoom conversation, so there is no limitation to the feeling of communication felt due to the processing, response, or delivery times within the experience.

4. Interaction with the character has to feel meaningful and influential when appropriate (to create a feeling of communication)
By utilising Barnum Statements and adjacent writing and direction techniques, I've managed to create an experience that feels much more meaningfully interactive than could be presumed by the sum of its parts. A large number of presumed audience behaviours can be accounted for and responded to in a way that doesn't feel inappropriate given the situation or the temperament of the character. While technically audience members can find the edges of the experience by attempting to go off the rails, this is very much not in the spirit of the interaction presented to them in the story. If an audience member in the cinema faces the wrong

direction to test the limits of the experience of the film, and decides to be upset when they can't see what's going on in the story, then I'm not sure the cinema or director is to blame. If an audience member chooses to find the edges the experience they will be found and the experience may be unsatisfying, but if a participant goes along with the social convention the experience asks of them then they should stay firmly within the boundaries of what we have anticipated and prepared responses for.

5. The audience has to have an active role in the story, either as a character or playing themselves (to help the audience suspend their disbelief and to create a feeling of communication)
By situating the audience as the protagonist of the story, and essentially having them play themselves, we have allowed them to much more easily suspend their disbelief with the setting of the story, which should help encourage a suspension of disbelief more broadly throughout the experience. Likewise, the audience has a crucially active role in the experience, so much so that it does not move forward without their input at certain points which, when paired with the suspension of disbelief, is intended to help them feel like they are meaningfully communicating with what is actually a rather unintelligent system.

From these analyses it's clear that the experience is well equipped for the research I've planned to undertake. In order to ensure its appropriateness I'll make sure the following occurs during the process of the study of the experience. Participants will be prompted to act as they would do on a first date during the study briefing, this is to prepare them for the experience, encouraging their politeness, and therefore their willingness to follow the direction of conversation as dictated by the character in the experience and diminish straying from the anticipated behaviours of the experience. Participants will be informed that they will be viewing the experience multiple times, so that they might anticipate being able to replay the experience and reach their own conclusions about the effect replaying the experience will have on their journey through the narrative, increasing the ephemerality of each individual experience run through, and therefore it's feeling of presence and immediacy.

5.6. GUEST Study Design

Having analysed my artefact, and reaching an academically and practically satisfying conclusion, I will now talk us through how I set up my research process in order to study the artefact. I needed this study to be able to allow me to examine whether different combinations of Narrative and Interactivity, as well as different uses of audience behaviour data, significantly impacted audience Enjoyment. The automated research assistant running the study was also an object worth studying, so that needed to be accommodated without impacting on the Enjoyment of the undergoing of the experiences themselves.

The study has been designed to efficiently allow me to address all three of my research questions with a single pool of participants, allowing me to attempt to bypass any experimental validity that this repeated measures design might cause using the adapted Solomon Four Group design. The study allows participants to experience GUEST multiple times, and feedback on their Enjoyment of the experience each time via a series of questionnaires, again delivered automatically. Their journey through the study is guided by an automated research assistant powered using the same system as that which runs GUEST itself, namely video clips

which play in the correct or in response to audience Speech Presence. A final section of the study asked participants their thoughts about this assistant.

Each participant underwent the experience three times, with the first two runs through the experience being driven by the same navigation method (either Quantic, Catherine, or Random), and the third being driven by a different one. Half of the participants were given a questionnaire about their Enjoyment of the experience after each run through, and the other half were only given them after the final two runs through, with the first one acting as a trial run. Once a questionnaire had been filled out, the automated research assistant would ask follow up questions based on any significant responses for the first questionnaire and any significant changes in their responses between questionnaires.

Participants were also asked short interview questions by the automated researcher assistant directly after each run through of the experience to record any immediate thoughts about that version of the experience. These questions were:

- Do you have any initial thoughts on how you found it?
- How did the date go, what did you think happened during it?
- How did you feel about the person you went on the date with?
- Did you notice any technical issues during your date at all?

Figure 5.8. Shows the final system digram for GUEST. The audience member (yellow) interacts with the experience through Zoom (green) which is then taken by the researcher's computer (blue) and directed into GUEST (pink). Visual information from Zoom would be fed into the eye tracking software using a virtual webcam, which then controlled the researcher's computer cursor, which was read as gaze movement by GUEST. Audio information was fed into GUEST using virtual audio cables. When appropriate, the audience member would fill in a questionnaire which would be sent (red) to the researcher who was puppeteering certain elements of the experience. Now I have my final research experience, let's turn my attention to the research surrounding it. Ultimately, I want to know if the different versions of my experience are enjoyable or not, so I can work out if the features that differ between these experiences are responsible for this difference of Enjoyment scores. I also want to be able to have participants experience the experience multiple times to fully appreciate the deployability that the multi-linear narrative grants them, to see if this further impacts Enjoyment across multiple exposures to the experience. My next chapter will delve into these ideas and explore the study design that I will use to make sure my research addresses my research questions effectively and fruitfully.

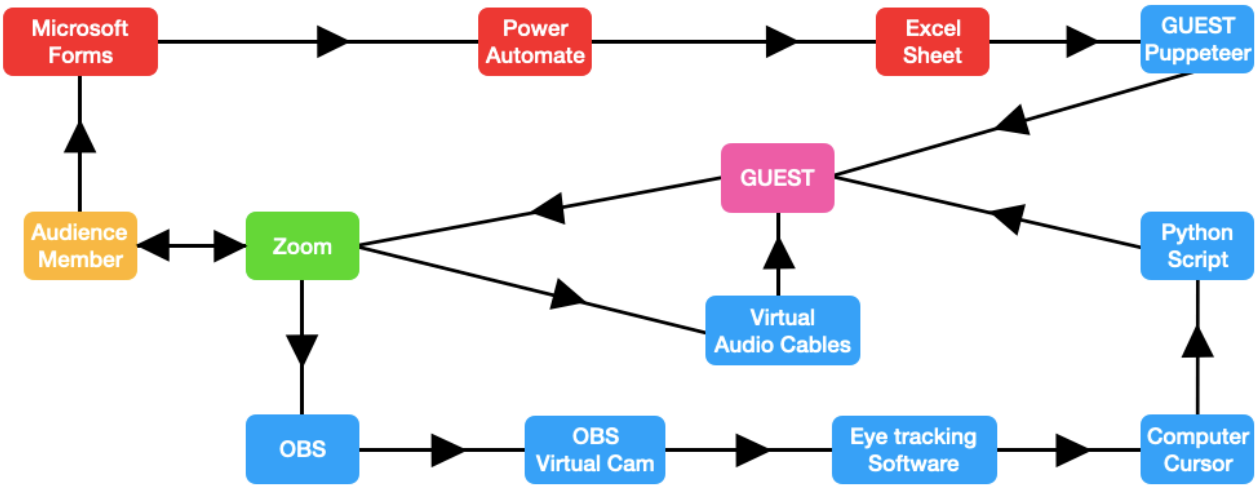

Figure 5.8.) Flowchart detailing the interactions between the sections that make up GUEST.

Our first research question, *What combinations of Interactivity and Narrative make enjoyable stories?*, can be answered by comparing the scores in different Enjoyment subcategories between different run throughs of the experience which vary in interaction method and/or similarity of narrative path taken. Our second research question, *What uses of audience behaviour data make enjoyable stories?*, can be answered by comparing the scores in different Enjoyment subcategories between different run throughs of the experience which vary in proportion of their narrative path controlled by different audience behaviours. Our third research question, *Can the system that is used to drive the experience be used to run the research about the experience?*, can be answered by analysing the content of the participant responses about their interactions with the automated research assistant. I'll then collate these individual results to see what they can tell us about audience Enjoyment towards interactive narratives and systems in general, and propose a series of guidelines for creatives, both academic and artistic, who might want to explore using these systems for their own practice in the future.

6. Narrative vs Interactivity

6.1. Introduction

With *GUEST*, I set out with a very clear design goal, to build a lifelike conversational agent that could be made to feel meaningfully responsive by focusing on creativity rather than focusing on technology or, to put it simply, by working smart rather than working hard. This was the right trajectory for this experience because the perception of whether something is lifelike or simulated, whether something is present and responsive, takes place in the mind of the audience or participant. Keeping that in mind, it could be possible to create all the same feelings of presence and responsiveness that would accompany a real-life human conversational interaction without having to pick apart the process of that interaction, reverse engineer an artificial system which emulated each part of that interaction, and execute a perfectly sensible and appropriate response to any potential or anticipated audience behaviour. There are many different technological approaches to interactive systems, each with their own benefits and weaknesses. Self service systems, such as at a self service check-out in a supermarket, are technically simple and easy to implement but often frustrate customers with their limited interaction options and the way they come across as impersonal, particularly when compared to the previous standard of having a real-life human performing this role (Dabholkar et al, 2003). Conversational agents can help alleviate this feeling of impersonality, but also come with their share of complications. Chatbots presented without a physical form, such as those that help children to learn second languages in schools (Fryer & Carpenter, 2006), can often handle a larger anticipated input of user behaviour, but can suffer from the same impersonality issues and require a more complicated system in order to operate the larger load of anticipated responses, lowering their technological accessibility. Virtual avatars, such as customer service assistants within the world of e-commerce (Qiu and Benbasat, 2010), and physical robots, such as those that assist the elderly in health care scenarios (Caic et al, 2018) can reduce the feelings of impersonality but still fail to promote anything simulating a properly interactive relationship (Marinova et al, 2017). The more anticipated behaviours they try and create sensible responses for the more complicated their systems can become to create and operate, therefore the more expensive they become to implement and maintain. Also, whether virtual or physical, by making these automated characters closer in appearance to real humans you risk an accidental venture into the uncanny valley (Mori, 2012), a term used to describe when something human-like, but not perfectly human, counterintuitively creates a feeling of discomfort rather than the intended more comfortable user experience, as represented in Figure 6.1.

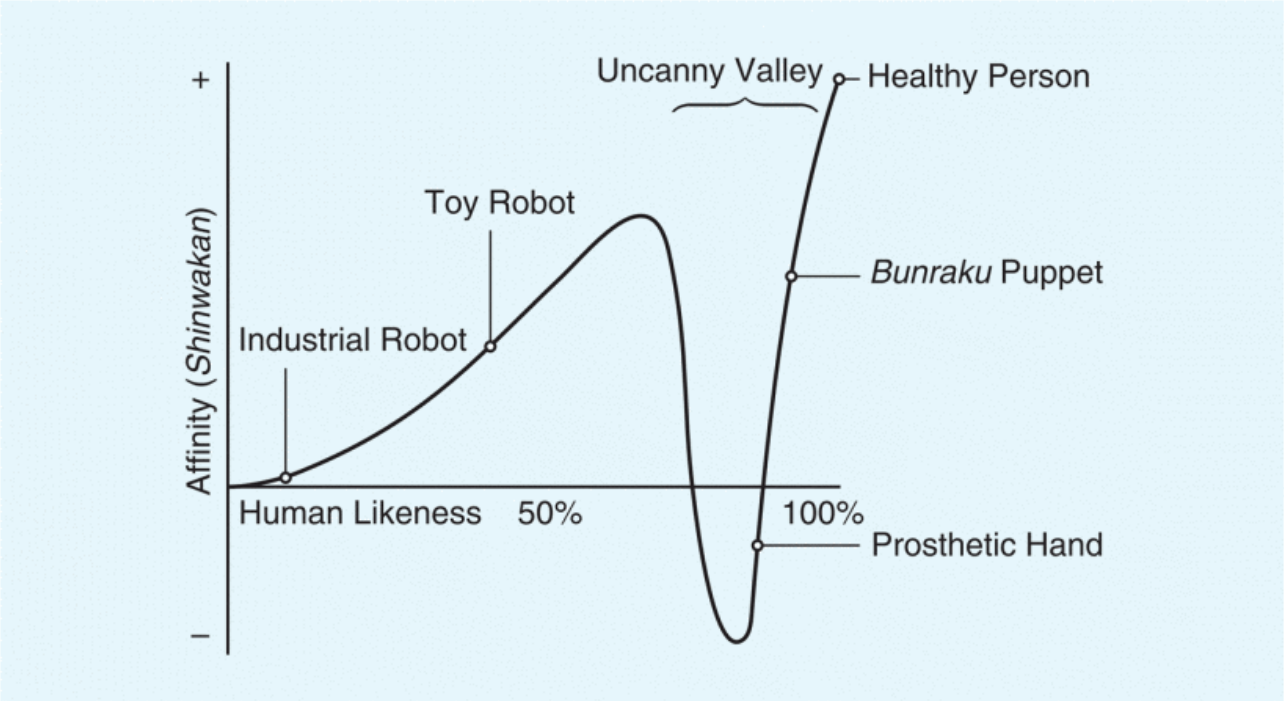

Figure 6.1.) Visual representation of the uncanny valley, from Mori (2012). The line on the graph shows the affinity, or comfort and recognition as human, of an entity as it becomes more recognisably human, with a plummeting affinity when an entity reaches an "almost-humanlike" appearance.

From this I can see that the ideal conversational agent would have to be simple to create and maintain, allowing it to be affordable and easy to implement and adapt. As well as this, it would have to be not only able to respond to a wide range of anticipated user behaviour but to do so in a way that felt meaningful and realistic to the user. Put simply, a conversational agent that the user could enjoy interacting with. These two qualities can seem like they exist at either ends of a spectrum, with a more complicated system needed to anticipate and satisfy a more complex range of user behaviours. However, I believe that there is another way to create a technologically simple system that can still react to a wide range of user behaviours in a way that feels meaningful and personal for users, to the extent that they might actually enjoy interacting with the automated system. An agent that would strike a balance between practicability and applicability.

GUEST uses several creative elements to overcome these issues while replicating the benefits of the above systems, as detailed throughout Chapter 5. The structure of the experience can be seen in Figure 6.2. below. The system is made without the need for any artificial intelligence, any natural language processing, or any complicated coding methodologies so much so that it could be written and customised by a beginner. The system also utilises pre-recorded footage of human performers, meaning that my conversation agents feel like real human beings because, aesthetically at least over the remote interaction context, they are. Inspired by Barnum Statements, phrases that feel personal but that generally apply to a wide range of the population (often employed within horoscopes, see Section 5.4.1.), the characters' questions and responses to user behaviour are written to feel personal and meaningfully responsive but crafted so that they would be sensible responses to a wide range of user input. I also have a system which, by the narrative of its user experience journey, anticipates and limits the behaviour of its users, increasing the amount that my fixed responses can

feel purposeful and personal to each user. Finally, my system doesn't actually understand the behaviour of my users, which can be very intensive from a processing and system architecture perspective, but instead infers meaning from other features of the user's interactions, specifically Speech Presence and Overt Attention. By combining these qualities, I create a system that is able to be run automatically, feels humanlike in its appearance and execution, and is simple to implement and adapt. I was able to show that, in spite of the low technological complexity of *GUEST*, I was still able to achieve a high degree of Enjoyment from participants of the experience. I broke down which elements of Enjoyment were the most significant using the robust battery of Enjoyment questionnaire items from Roth (2015; see Section 3.4. for more detail) and then focused on these elements further using follow up questions automatically presented to the participants depending on the significance of their changes in questionnaire answers between trials. A mixture of qualitative and quantitative analyses were then carried out to pinpoint which measures of Enjoyment were the most significant for each of the main two qualities of this experience; Interactivity and Narrative.

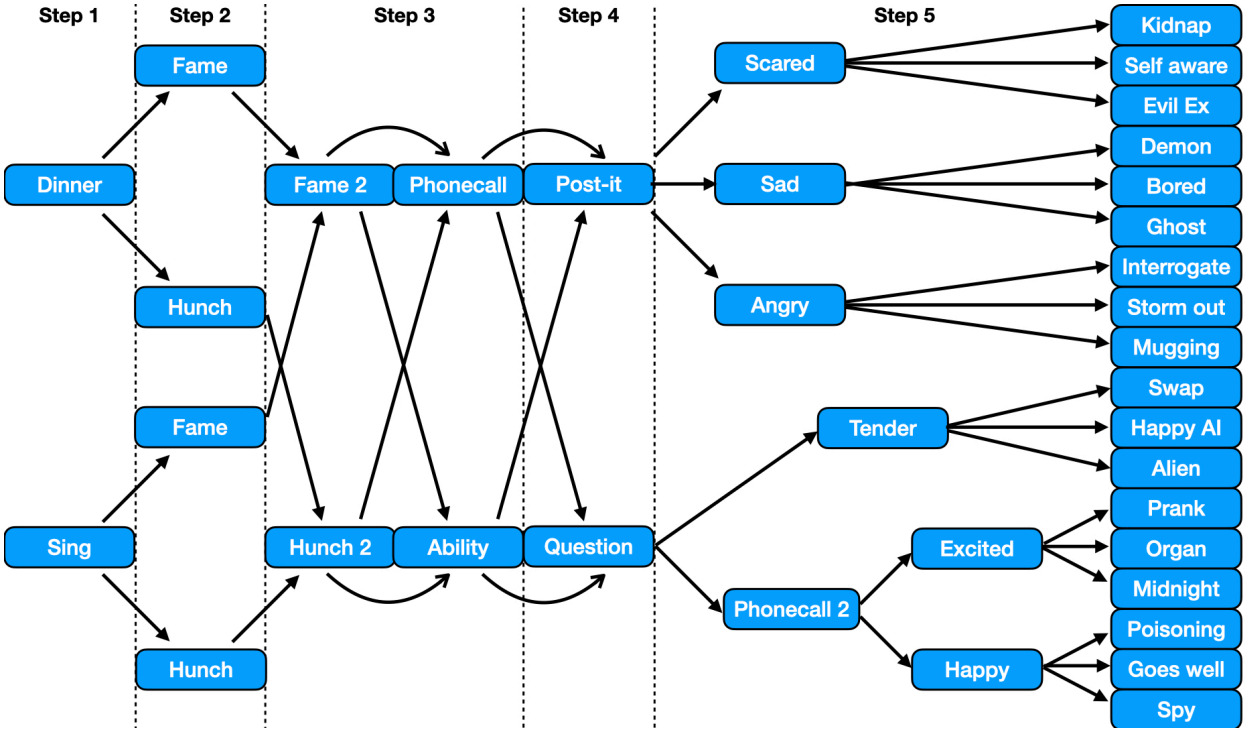

Figure 6.2.) Flowchart showing the narrative paths for GUEST, with each block labelled with the appropriate scene from the experience. The blue blocks are the content of the story, the fabula, with their arrangement and how one navigates between them, as shown by the arrows, being the syuzhet. The steps (1-5) are described in more detail in Section 7.1.

6.2. Results

I wanted to investigate whether there were any significant relationships between the methods of Interactivity and styles of Narrative used within the experience and the Enjoyment scores provided by the participants immediately after having taken part in the experience.

22 participants were recruited to take part in the study via public online calls for participation. These were disseminated via two main channels, with the University of Nottingham sharing the call out to its students and researchers, primarily associated with the Department of Computer Science, and the theatre company Chronic Insanity sharing the call out via its social media channels, associate artist groups, and other digital artist networks throughout the East Midlands. This was designed to recruit from a pool of potential participants somewhat familiar with interactive experiences and digital technologies, which would be the intended audience of GUEST if it were a more widely available digital storytelling experience. Participant recruitment and information materials, as well as their demographic data, can be found in Appendices F through J.

The study took place over Zoom and lasted approximately 50-60 minutes on average, during which the participant played through the experience and answered a questionnaire about their experience multiple times. The questionnaire asked participants to rate 39 factors, grouped into 11 categories, concerning their Enjoyment of the experience on a 5 points Likert scale. To satisfy my Solomon Four Group inspired design (Allen, 2017), half the participants answered two questionnaires, while the other half answered three to ensure a spread of pre-test and treatment conditions amongst the group. This resulted in a total of 56 questionnaire responses.

Participants were then asked follow up questions to elaborate on any significant responses in specific categories, taken as averages of initial strong ratings in the first questionnaire or strong changes in ratings in subsequent questionnaires. Responses from these follow up questions, and as well as other interview questions throughout the study, were then transcribed and analysed thematically. These were the only additional qualitative data collection measures taken, as explained in Section 3.4.

Due to the repeated measures design of the study, and an observed lack of normality in the questionnaire responses, a Freidman Test was used to undertake my Solomon Four Group style analysis of whether or not multiple exposures to the experience or questionnaire affected the validity of future questionnaire responses. As per the Solomon Four Group analysis, the four measurement groups I used were combinations of the presence and/or lack of pre-testing and/or treatment conditions. The mean responses for each of the 39 items in the questionnaire, for each of the four test groups, were calculated and used for this analysis. Table 6.1. shows these mean responses.

Questionnaire Item	Group 1 Pre-test Treatment	Group 2 Pre-test No Treatment	Group 3 No Pre-test Treatment	Group 4 No Pre-test No Treatment
1	1.62	1.67	1.67	1.80
2	1.62	2.33	1.83	2.10
3	1.57	1.42	1.83	1.60
4	1.86	1.42	1.58	1.70
5	1.90	1.67	2.17	1.70

Questionnaire Item	Group 1 Pre-test Treatment	Group 2 Pre-test No Treatment	Group 3 No Pre-test Treatment	Group 4 No Pre-test No Treatment
6	2.14	2.00	2.58	2.00
7	2.81	2.92	2.75	3.10
8	2.48	2.58	2.75	2.40
9	2.62	3.33	2.08	2.50
10	2.81	2.75	3.25	3.30
11	3.14	3.33	3.25	3.10
12	2.81	3.08	2.75	2.60
13	2.14	1.92	2.17	2.00
14	2.67	2.58	2.25	2.50
15	3.10	3.58	3.00	2.90
16	2.29	2.33	2.50	2.40
17	3.43	3.75	3.83	3.80
18	2.48	2.58	2.92	2.40
19	4.05	3.58	3.25	4.20
20	4.19	3.75	3.42	4.00
21	3.57	3.00	3.50	3.70
22	1.57	1.58	1.58	1.70
23	1.67	1.67	1.67	1.50
24	4.24	4.25	4.58	4.60
25	2.14	2.58	2.25	2.60
26	3.90	3.42	3.92	3.90
27	2.05	2.17	2.17	1.90
28	2.43	2.42	2.58	2.60
29	2.48	3.08	1.83	2.80
30	3.33	3.67	3.08	3.30
31	2.05	1.67	2.08	2.60
32	3.14	3.33	3.25	4.00
33	3.48	3.50	3.75	3.20
34	2.95	3.42	2.92	2.70
35	4.05	3.83	4.42	3.40

Questionnaire Item	Group 1 Pre-test Treatment	Group 2 Pre-test No Treatment	Group 3 No Pre-test Treatment	Group 4 No Pre-test No Treatment
36	3.38	3.75	4.08	3.40
37	3.10	3.58	3.50	3.00
38	2.24	2.42	2.58	2.10
39	2.95	3.08	3.42	2.90

Table 6.1.) Mean responses of each Enjoyment questionnaire item for each combination of pre-test and treatment exposure conditions

The Freidman Test showed that there was not a statistically significant difference in the questionnaire responses due to the pre-test and treatment conditions, $\chi 2(3) = 3.668$, $p = 0.300$. This means that having experienced *GUEST* or the research questionnaire once doesn't have a significant impact on the way in which *GUEST* was experienced, or the questionnaire completed, any subsequent time.

Given that this result shows the repeated measures design of the study had no significant effect on the participant's responses to the questionnaire, I continued with the analysis without adjustment or further considerations.

6.2.1. Interactivity - Quantitative Results

I compared the mean Enjoyment responses for each of my different Interactivity conditions; the Quantic, Catherine, and Random Methods (see Section 5.4.2 for more detail about these content delivery methods). A Shapiro-Wilk test was conducted for each of these Interactivity groups, all of which showed adherence to normality (Quantic $W(39) = 0.952$, $p = 0.093$; Catherine $W(39) = 0.965$, $p = 0.268$; Random $W(39) = 0.968$, $p = 0.322$). Given the normal distribution of these responses, a one-way repeated measures ANOVA was conducted to look for significant differences between these scores. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated, $\chi^2(2) = 5.155$, $p = .076$. The repeated measures ANOVA determined that mean Enjoyment responses differed statistically significantly between the interaction methods ($F(2, 76) = 7.092$, $P = 0.002$). Post hoc analysis with a Bonferroni adjustment revealed that Enjoyment measurements were significantly different between the Catherine and Quantic (0.193 (95% CI, 0.04 to 0.35), $p = 0.009$) and Catherine and Random conditions (0.135 (95% CI, 0.02 to 0.25), $p = 0.013$), but not between the Quantic and Random conditions (0.058 (95% CI, -0.07 to 0.19), $p = 0.789$). This analysis shows that Enjoyment measurements for the Catherine condition were, in general, significantly higher than for the Quantic and Random conditions, meaning that the Catherine condition was the least enjoyable in general. This also shows that there was not a significant difference in the Enjoyment scores between the Quantic and Random conditions.

However, this is a general figure averaged out across all the responses, and analysing each question cluster individually will tell me a lot more about which kinds of Enjoyment vary significantly between the three experience style conditions. Table 6.2. shows the results for the individual Friedman Tests that were conducted to examine this.

Enjoyment Condition	Friedman Test result	Significant?
Pure Enjoyment	$\chi2(2) = 3.000, p = 0.223$	No
Curiosity	$\chi2(2) = 4.667, p = 0.097$	No
Suspense	$\chi2(2) = 4.500, p = 0.105$	No
Aesthetic Pleasantness and Eudaimonic Appreciation	$\chi2(2) = 4.909, p = 0.086$	No
Presence	$\chi2(2) = 6.000, p = 0.050$	Yes
Emotional State	$\chi2(2) = 0.261, p = 0.878$	No
System Usability	$\chi2(2) = 2.667, p = 0.264$	No
Satisfaction of User Expectations	$\chi2(2) = 1.000, p = 0.607$	No
Optimal Task Engagement	$\chi2(2) = 2.800, p = 0.247$	No
Autonomy	$\chi2(2) = 3.500, p = 0.174$	No
Effectance	$\chi2(2) = 3.000, p = 0.223$	No
Character Believability	$\chi2(2) = 1.000, p = 0.607$	No

Table 6.2.) Results of the Friedman Tests for each aspect of the Enjoyment measurement questionnaire, measured and compared across each of the Interactivity methods.

For questions measuring Presence, the Friedman Test showed that there was a statistically significant difference in the questionnaire responses due to the experience Interactivity condition, with the lowest Enjoyment score, or strongest Enjoyment, in the Quantic condition and the highest Enjoyment score, or weakest Enjoyment, in the Catherine condition.

These results show that a significant difference exists in my data between the Presence scores for the three Interactivity conditions, with experiences using the Catherine method of Interactivity scoring higher and those using the Random or Quantic methods scoring lower, with the Quantic method the lowest scoring. This means that the Catherine condition was the least enjoyable of the three conditions, and that this lower Enjoyment evoked in the participants might be the result of a perceived lack of Liveness from the experience. Given the Presence questions specifically asked about the participant's Enjoyment concerning three different variations of Liveness, each aligning with the three categories of Immersion, Presence, or Embodiment (as discussed in Section 3.2.) further analysis was conducted to see if a particular variety of Liveness was more or less responsible for this difference in Enjoyment scores.

A Shapiro-Wilk test was conducted for each of these question responses in each Interactivity groups, few of which showed adherence to normality, as shown in Table 6.3.

Data set	Shapiro-Wilk test results	Departure from normality?
Quantic x Immersion	W(19) = 0.711, p < 0.001	Yes
Quantic x Presence	W(19) = 0.853, p = 0.008	Yes
Quantic x Embodiment	W(19) = 0.879, p = 0.021	Yes
Catherine x Immersion	W(19) = 0.841, p = 0.005	Yes
Catherine x Presence	W(19) = 0.900, p = 0.049	Yes
Catherine x Embodiment	W(19) = 0.943, p = 0.295	No
Random x Immersion	W(18) = 0.753, p < 0.001	Yes
Random x Presence	W(18) = 0.872, p = 0.019	Yes
Random x Embodiment	W(18) = 0.916, p = 0.109	No

Table 6.3.) Results of the Shapiro-Wilk tests for each Liveness Enjoyment question in each interactive method condition.

Due to the lack of normality in the data sets, a series of Friedman tests were conducted to look for relationships between Interactivity method and Enjoyment score for the Liveness specific questionnaire items. For Immersion, the Friedman Test showed that there was not a statistically significant difference in the questionnaire responses due to experience Interactivity method for the Immersion question, $\chi2(2) = 2.310$, $p = 0.315$. For Presence, the Friedman Test showed that there was not a statistically significant difference in the questionnaire responses due to experience Interactivity method for the Presence question, $\chi2(2) = 3.695$, $p = 0.158$. For Embodiment, the Friedman Test showed that there was not a statistically significant difference in the questionnaire responses due to experience Interactivity method for the Embodiment question, $\chi2(2) = 2.906$, $p = 0.234$.

These results mean that some other factor outside of the Liveness spectrum is governing the significant differences in Enjoyment scores for Liveness, and indeed overall, observed between the Interactivity methods. However, the same pattern for Enjoyment measurements was observed as in other broader data sets, that is to say that the mean Catherine responses were more highly scored than the Random and Quantic responses, showing this interaction method to be scored as the least enjoyable. Further qualitative analysis is necessary to understand this in more detail.

6.2.2. Narrative - Quantitative Results

As well as comparing the Enjoyment scores for the Interactivity conditions, I want to see if the variety of narrative paths the participants navigated along during their time with the experience changed their Enjoyment of the experience. The first half of the experience was built using two parallel story paths that

could be navigated between, before meeting at a bottleneck, while the second half of the experience eventually branched out into six story paths, which the user was not able to jump between, resulting in a total of 18 possible endings. This meant that there were a total of 144 different paths through the experience (2x2x2x18). However, not every path needs to be navigated down by a participant in order for me to analyse how navigation affects Enjoyment. I analysed this by comparing the differences in the Enjoyment scores from consecutive runs through the experience for a participant, alongside a measurement of how similar or different the subsequent runs through of the experience were from the initial run through. This method uses the first run through as a control version of the narrative for each participant and compares variations in the narrative directly to potential variations in Enjoyment score for follow up viewings of the experience.

A Shapiro-Wilk test was conducted for each of these narrative groups, as well as their relevant differences in Enjoyment scores, not all of which showed adherence to normality. Table 6.4. shows this in more detail.

Data set	Shapiro-Wilk test results	Departure from normality?
Similarity of Trail 2 to Trail 1; Half 1	W(12) = 0.765, p = 0.004	Yes
Similarity of Trail 2 to Trail 1; Half 2	W(12) = 0.737, p = 0.002	Yes
Similarity of Trail 2 to Trail 1; Whole Trial	W(12) = 0.896, p = 0.143	No
Differences in Enjoyments scores between Trials 2 & 1	W(12) = 0.972, p = 0.932	No
Similarity of Trail 3 to Trails 1 & 2; Half 1	W(22) = 0.846, p = 0.003	Yes
Similarity of Trail 3 to Trails 1 & 2; Half 2	W(22) = 0.681, p < 0.001	Yes
Similarity of Trail 3 to Trails 1 & 2; Whole Trial	W(22) = 0.904, p = 0.036	Yes
Difference in Enjoyments scores between Trials 2 & 3	W(22) = 0.965, p = 0.604	No
Similarity of Trail 3 to Trails 1 & 2; Half 1; Detialed	W(22) = 0.892, p = 0.020	Yes
Similarity of Trail 3 to Trails 1 & 2; Half 2; Detailed	W(22) = 0.669, p < 0.001	Yes
Similarity of Trail 3 to Trails 1 & 4; Whole Trial; Detailed	W(22) = 0.915, p = 0.060	No
Differences in Enjoyments scores between Trials 3 and an average of Trials 1 & 2	W(22) = 0.957, p = 0.427	No

Table 6.4.) Results of the Shapiro-Wilk tests, looking to see whether or not the narrative and relevant Enjoyment score data groups have a distribution adhering to or departing from normality.

To investigate relationships between the narrative novelty of the experience and the Enjoyment scores experiencing it generated, and due to the lack of normally distributed data sets, a Spearman's rank-order correlation was run to determine the relationship between the experience narrative similarity measurements and the measurements of change in the Enjoyment scores associated with them. For similarities between Trial 2 and Trial 1, there was a weak, negative correlation between the similarity measurement and the change in Enjoyment scores, which was not statistically significant ($r_S(10) = -.186$, $p = .563$). For similarities

between Trial 3 and Trials 1 & 2, there was a weak, negative correlation between the similarity measurement and the change in Enjoyment scores, which was not statistically significant ($r_S(20) = -.038$, $p = .866$). For similarities between Trial 3 and a more detailed measurement of Trials 1 & 2, there was a weak, negative correlation between the similarity measurement and the change in Enjoyment scores, which was not statistically significant ($r_S(20) = -.120$, $p = .596$).

These results show that there was not a significant relationship between the changes in Enjoyment scores between trials and the novel narratives experienced by the participants on their most recent trial. This suggests that changes in the novelty of Narrative do not have a significant effect on participant Enjoyment of the experience.

To be thorough, I also investigated relationships between the Narrative quality of each half of the experience and the Enjoyment scores experiencing it generated in the same way as the above Narrative feature. Spearman's rank-order correlations were run to determine the significance of the relationship between the experience narrative paths take during each step of the experience and the Enjoyment scores associated with their trial number. Correlations between narrative path step and Enjoyment questionnaire items can be seen in Table 6.5. The questionnaire items that correspond with each number are detailed in the following list, with the frequency of their correlations in brackets following them:

1. The experience was entertaining (1)
4. During the experience, I felt interested (2)
6. At some moments I was anxious to find out what would happen next (1)
7. Sometimes I was worried about how the story would develop (1)
10. The experience told me something about life (1)
13. I felt like I was a part of the character’s world (3)
14. I felt like the character was part of my world (3)
15. I felt like there was no difference between my world and the world of the character (2)
18. After experiencing the story, I feel enthusiastic (1)
19. After experiencing the story, I feel sad (2)
20. After experiencing the story, I feel annoyed (1)
24. I found the system very difficult to use (2)
26. I expected the experience to be more enjoyable (2)
27. During the experience I felt competent enough to meet the demands of the situation (3)
28. During the experience I acted spontaneously and automatically without having to think (1)
30.During the experience I had a good idea while I was performing about how well I was doing (2)
31. During the experience I was completely focused on the task at hand (2)
32. I had the impression that I was able to make many different events happen in the story (1)
34. I felt strong limitations to my decisions how the story should proceed (2)

Trial	Path step	Enjoyment Questionnaire Item Correlations
1	1	13
	2	4, 10, 13, 14, 26, 27, 34
	3	4
	4	13, 14, 26, 34
	5	7
2	1	24, 27
	2	28, 30
	3	1, 15, 30
	4	18
	5	32
3	1	24
	2	19, 20, 31
	3	6, 14, 15, 19, 31
	4	None
	5	27

Table 6.5) Significant correlations between the expression of different instances of sections of the narrative path in the experience and the ensuing Enjoyment scores.

These results are particularly interesting because they show that some groups of Enjoyment questionnaire items made more correlations with narrative steps than others. Correlations with questionnaire items measuring Presence and Optimal Task Engagement were present the most, 8 instances each, Followed by 4 correlative instances of Emotional State and 3 of Autonomy. Questionnaire items from Curiosity, Suspense, System Usability, and Satisfaction of User Expectations each correlated with 2 narrative steps. The two groups of Enjoyment and Aesthetic Pleasantness and Eudaimonic Appreciation each correlated with 1 narrative step. Questionnaire items from Effectance and Character Believability did not correlate with any narrative steps.

This shows that specific sections of narrative correlated the most with the scoring of the Enjoyment categories of Presence and Optimal Task Engagement, followed by Emotional State and Autonomy. There was no correlation between narrative sections and questions measuring Effectance or Character Believability. The other categories all had low instances of narrative section correlation.

These results were further analysed to look for higher order significant relationships. Spearman's rank-order correlations were conducted to look for these relationships between each trial, the narrative steps within each trial and the frequency of correlations for each Enjoyment measurement category. These results showed a

strong negative correlation between narrative step and measurements of System Usability, which was statistically significant ($r_s(13) = -0.555$, $p = .032$). This means that the earlier a step was in the narrative pathway the more likely it was to correlate with the System Usability measurement reported by the participant, and the more likely it was to influence the measurement of that aspect of Enjoyment in the participant. Put simply, the initial stages of the narrative were significantly influential over the measurement of System Usability.

There were also intra-item correlations found among some of the Enjoyment questionnaire categories. Table 6.6 shows these significant relationships in more detail, but as an overview, Aesthetic Pleasantness and Eudaimonic Appreciation had strong positive correlations with Curiosity, Satisfaction of User Expectation, and Autonomy and Satisfaction of User Expectation had strong positive correlations with Presence and Autonomy. Therefore, if a narrative step influenced one of these Enjoyment questionnaire categories, then it was significantly more likely to influence the other categories connected to it along these relationships and in the same direction, visualised below in Figure 6.3.

Enjoyment Measurement Categories	Spearman's Rank Order Correlation
Aesthetic Pleasantness x Curiosity	($r_s(13) = 0.681$, $p = .005$)
Aesthetic Pleasantness x Satisfaction of Expectations	($r_s(13) = 0.681$, $p = .005$)
Aesthetic Pleasantness x Autonomy	($r_s(13) = 0.535$, $p = .040$)
Satisfaction of Expectations x Presence	($r_s(13) = 0.653$, $p = .008$)
Satisfaction of Expectations x Autonomy	($r_s(13) = 0.784$, $p = .001$)

Table 6.6.) Results of the Spearman's Rank Order Correlations conducted on the frequencies of correlation between narrative step and Enjoyment measurement questionnaire categories.

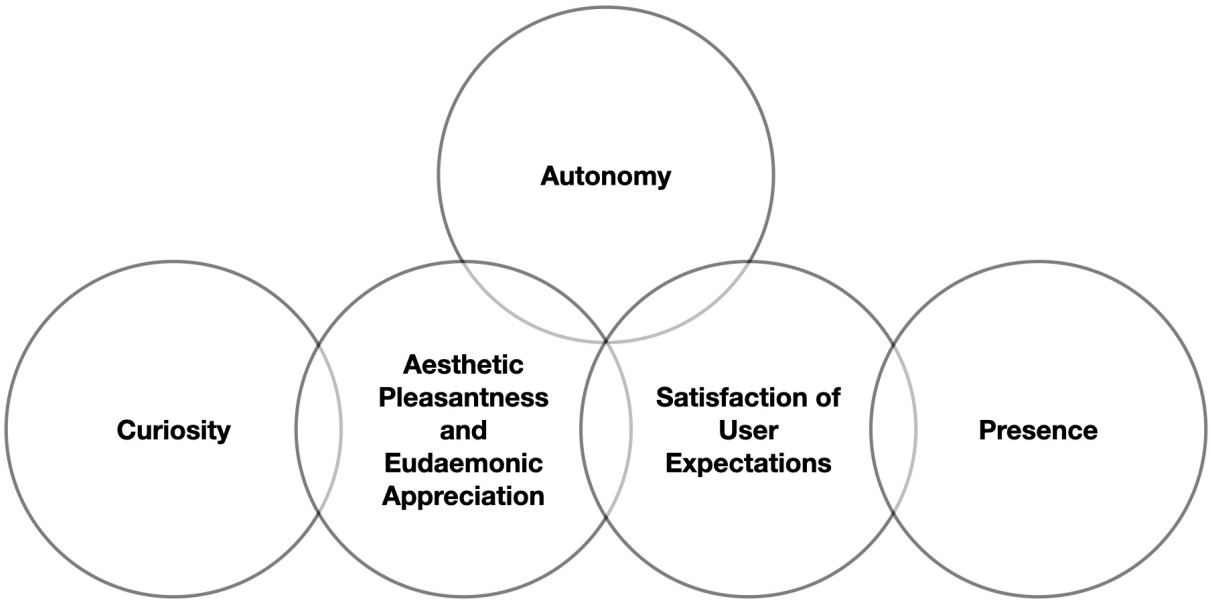

Figure 6.3.) Venn diagram showing the significant and strong positive correlational relationships between the Enjoyment measurement categories, with an overlap indicating where, if a narrative step significantly influenced an Enjoyment measure, which other Enjoyment measures were also influenced.

Further analysis was conducted on the changes in Enjoyment scores to look for significant differences between them in case this produced further direction for subsequent qualitative analysis on the effect of Narrative on participant Enjoyment.

Due to the normally distributed nature of the changes in the Enjoyment scores, see Table 6.3, these data sets were compared using Paired Samples T-tests to look for any significant differences between the Enjoyment scores associated with different narrative similarities.

The change in Enjoyment scores between the two narrative conditions is not statistically significant; $t(11) = 1.985$, $p = .073$. However, when a more appropriate measure of Trial similarity is used for comparing Trial 3 to the other trials, the change in Enjoyment scores between the narrative conditions is statistically significant: $t(11) = 2.807$, $p = .017$. Given that this change is an average lowering of the Enjoyment score, this result shows that the participants increased their Enjoyment of the experience in Trial 3 compared to an average combined Enjoyment score from Trials 1 and 2. However, I am unsure what feature of the experience is responsible for this because, as a result of the experimental design, Trial 3 varies from Trials 1 and 2 in Interactivity method as well as narrative similarity. To explore the potential relationship with narrative similarity further, I conducted individual Wilcoxon Signed-Ranks tests on the changes in Enjoyment scores for each Enjoyment subcategory to reveal if there were any more specific significant relationships in the Enjoyment score data changes. The results of this analysis are displayed in Table 6.7. Due to the exploratory nature of this analysis, my aim to further investigate any significant effects detected, my relatively small

sample size, and the conservative nature of the correction itself, I will not be applying a Bonferroni correction to this battery of tests (Armstrong, 2014).

Enjoyment Condition	Trial 3 - Trials 1 & 2 Mean Rank	Trial 2 - Trial 1 Mean Rank	Wilcoxon Signed-Ranks Test Results
Pure Enjoyment	-0.3333	-0.2500	Z = -0.416, p = 0.678
Curiosity	-0.0417	0.3611	**Z = -2.082, p = 0.037**
Suspense	-0.01250	-0.1667	Z = -0.460, p = 0.645
Aesthetic Pleasantness and Eudaimonic Appreciation	-0.4306	0.0278	Z = -1.471, p = 0.141
Presence	-0.1667	-0.2222	Z = -0.562, p = 0.574
Emotional State	0.0069	0.0694	Z = -0.623, p = 0.533
System Usability	-0.0278	0.1111	Z = -1.227, p = 0.220
Satisfaction of User Expectations	-0.2500	0.0833	Z = -1.489, p = 0.137
Optimal Task Engagement	-0.2583	-0.2500	Z = -0.459, p = 0.646
Autonomy	-0.1771	0.0625	Z = -0.668, p = 0.504
Effectance	-0.3958	0.1250	Z = -1.174, p = 0.240
Character Believability	-0.04167	0.2500	**Z = -2.255, p = 0.024**

*Table 6.7.) Results of the Wilcoxon Signed-Ranks tests conducted on the changes in each subcategory of the Enjoyment measurement questionnaire. Significant results are presented in **bold**.*

A Wilcoxon Signed-Ranks test indicated that the changes in measurements of Curiosity between Trial 3 and the previous trials were rated as significantly different compared to the changes in measurement between Trials 1 and 2. A Wilcoxon Signed-Ranks test also indicated that the changes in measurements of Character Believability between Trial 3 and the previous trials were rated as significantly different compared to the changes in measurement between Trials 1 and 2. This means that participants had a significant lowering of both their Curiosity and Character Believability scores as a result of experiencing Trial 3 when compared to the change between the first two trials, therefore they felt significantly more curious and that the character was significantly more believable during this final trial.

To explore the potential relationships between narrative similarity and the changes in Curiosity and Character Believability Enjoyment scores further, I conducted individual Wilcoxon Signed-Ranks tests on the changes in Enjoyment scores for each question that made up these Enjoyment questionnaire subcategories to reveal if there were further significant relationships in the variations in Enjoyment scores. These questions, and the results of the Wilcoxon Signed-Ranks tests, can be seen in Table 6.8. These results show a significant difference in the change in participant response to the questionnaire between Trial 3 and the previous two trials for the statement “I had the impression that the character responded in a thoughtful way to what I did”,

with the change in response between Trials 3 and Trials 1 and 2 being significantly lower, and therefore representing an increase in Enjoyment, when compared to the change in the same measure between Trials 2 and 1. However, it is difficult to distinguish between the cause of this significant observation being down to the changing narrative between the experiences or down to the change of Interactivity method between Trials 3 and Trials 1 and 2, and more direct analysis for Narrative and Interactivity should be undertaken to try and separate out any potential interaction effects. For now, to get to further examine the individual effect of Narrative on Enjoyment, I will use these results to help inform the direction of my narrative qualitative analysis.

Questionnaire Item	Trial 3 - Trials 1 & 2 Mean Rank	Trial 2 - Trial 1 Mean Rank	Wilcoxon Signed-Ranks Test Results
During the experience, I felt curious	2.50	4.60	Z = -1.529, p = 0.126
During the experience, I felt interested	5.00	4.20	Z = -0.439, p = 0.660
During the experience, I felt inquisitive	4.33	6.00	Z = -1.492, p = 0.136
I could feel what the character was going through	3.00	3.00	Z = -1.214, p = 0.225
I had the impression that the character responded in a thoughtful way to what I did	2.50	5.31	**Z = -2.393, p = 0.017**

*Table 6.8.) Results of the Wilcoxon Signed-Ranks tests conducted on the changes in Enjoyment measurements recorded for questionnaire items concerning Curiosity and Character Believability. Significant results are presented in **bold**.*

6.2.3. Interactivity - Qualitative Results

I conducted a directed content analysis (Potter & Levine-Donnerstein, 1999), substituting the open ended questions usually decided upon under the influence of previous theory and research (Hickey & Kipping, 1996), with my questions derived from the responses of my participants in real-time. The live questionnaire answers from each participant were used to generate immediate and relevant follow up questions, the answers to which I can analyse to help further understand the relationship between Interactivity and Enjoyment. More details about this methodology can be found in Section 8.1.

To direct the analysis of the transcripts of these auto-generated follow up question answers I will use the following findings from the above quantitative analysis:

- The experiences operated using the Catherine method were less enjoyable than the other two operation methods, particularly when it came to the scoring of Presence.
- The final trial of the study was significantly more enjoyable compared to the previous trials, particularly when it came to the scoring of Curiosity and Character Believability, with an extra focus on Theory of Mind

I analysed the questionnaire sections corresponding with the significantly interesting Enjoyment questionnaire categories (Presence, Curiosity, and Character Believability) and examined the semi-structured interview responses for inductive codes concerning Interactivity. I then followed the first strategy for a directed content analysis presented by Hsieh & Shannon (2005); searching the transcript of the relevant interview responses for and highlighting any text that appears to correspond to Interactivity. This highlighted text was then coded into categories and subcategories, influenced by both Interactivity and the relevant Enjoyment category, to allow for a more specific analysis of the data.

6.2.3.1. Presence

I analysed the interview responses for the Presence specific follow up questions and found two main reasons why audiences found the Presence that the experience evoked enjoyable when it came to the interactive quality of the experience. The Interactivity-relevant responses to the Presence question tended to concern the similarity of the experience to a real-life video chat experience (“I've been doing a lot of zoom calls. I like a lot over the last few months and so this is a very familiar situation to be in.”[Participant 2]) and the participant’s familiarity with this method of communication (“I had gotten so comfortable with the date that by the end it felt like we were. In the same space.”[P10]). If I take Liveness as a measurement of how similar the reality of the audience and the reality of the experience are, by replicating the same style of social interactivity as one might expect from a video chat application, namely talking and body language, I created an experience that was enjoyable due to the combination of the simplicity of the control system and the fit of the setting. This created a believable simulation of a real-world method of interaction, and the use of that real-world system to experience something enjoyable was clearly appreciated.

These responses also tended to reference the character in the experience responding with a high degree of accuracy when compared to a human conversation, either in speed (“There was a sensible gap between questions and answers and it did feel a little bit like a natural conversation.”)[P13] or appropriateness of the content of the responses (“it just felt like I was getting responses to what I was saying, which was nice”[P1]). To consider Liveness as above, a simulated character that behaves like a real human agent presents the audience with a system of interaction that they are familiar and comfortable with, allowing less energy to have to be used to “get used” to the experience and allowing the experience, and the Enjoyment that can be felt from interacting with it, to be more easily accessible to a participant.

6.2.3.2. Curiosity

I analysed the interview responses for the Curiosity specific follow up questions and found two main reasons why audiences found the Curiosity that the experience evoked enjoyable when it came to the interactive quality of the experience. The Interactivity-relevant responses to the Curiosity question tended to show an interest towards how the participant’s interaction with the character would affect change in the world of the experience (“Seeing how what I was saying was going to lead to something… how she reacted to that”)[P3]. This shows that this feeling of curiosity, concerning the agency of the participant, helped fuel their

Enjoyment of the experience. This also hints at some interaction between the interactivity and the narrative of the experience. Since the experience establishes that the way the participant interacts with it drives and influences the story, specifically that different participant behaviours can lead to different narrative outcomes, then a curiosity of how one's interaction would affect the experience links the interaction between the Interactivity and the Narrative of the experience to this Enjoyment measurement.

These responses also tended to refer to curiosity of the character innately due to their human-like appearance and behaviour, with many participants stating that they are generally curious whenever talking to, or interacting with, strangers ("I was interested in them. I suppose it's a stranger, isn't it?"[P4]) or getting to know new people ("I'm always curious when I meet new people, I want to see how they respond"[P21]) in relation to the character in the experience. This wouldn't be felt if the participants didn't recognise the characters as believable and present human agents, showing how this feeling of Enjoyment that they feel during a real-life interaction was replicated by my simulation not just because of it's aesthetic and the method of its crafting, but because of the method of its interaction.

6.2.3.3. Character Believability

I analysed the interview responses for the Character Believability specific follow up questions and found multiple reasons why participants found the Character Believability that the experience evoked enjoyable when it came to the interactive quality of the experience. Firstly, and echoed by the Presence Enjoyment measurements, the similarity to this experience and the interaction of a real-life video chat experience was cited as a reason for their Enjoyment of the experience ("It reminded me a lot of very similar conversations that you do have on a first date and zoom calls."[P7]). Another reason participants enjoyed the experience was due to its similarity to a real first date, particularly the capturing of the potential awkwardness of that social interaction ("It felt very natural… moments of just awkward silence… so that made the character believable"[P8]). This is particularly interesting as an observation as this is an example of the lack of a smooth interaction experience as contributing to the Enjoyment of the experience. The other significant comments about interaction so far have had participants praising a smooth interaction as contributing to their Enjoyment of the experience, but here I see the opposite with an uncomfortable experience contributing to the Enjoyment of the experience, but for equivalent reasons to some of the above Enjoyment measurements, namely its contribution to the simulation of a real-life interaction.

One of the subcategories coded for was references towards Character Unbelievability, specifically how finding the character unbelievable for reasons other than Interactivity was the trigger for them to begin questioning the similarity to real life of other parts of the experience, including the interactivity ("Same answers as above… I didn't believe for a minute that she was really responding to me"[P14]). This was mainly cited as being caused by the narrative in the experience ("there was very little variety that I could get with it"[P14]), however this was actually caused by the way the Narrative and Interactivity of the experience interacted. I know this from how participants pointed out how frustrating it was to make a decision to interact differently and to end up with the same narrative path as a previous run through of the experience ("Doing something new… she was like exactly the same all the way up to the end"[P19]). It isn't the narrative that is

causing the lessening of Enjoyment for the participant, but the anticipated change in narrative that they are attempting, and failing, to manifest in what has been promised is a responsive narrative. This shows how the intention of the repeated viewing of an experience is factored into the way in which a participant enjoys even a single run through of the experience. Also, participants reported that repeated interactions with a larger than life character made the character feel more believable as people came to accept their behaviour as a quality of the character rather than as a quality of the writing or direction of the experience ("I sort of accepted this weird crazy character. A little bit more than the first time"[P15]). By combing these two observations I can see the collective importance of the repeated viewing nature of the experience when it comes to Character Believability, namely that it can both harm and hinder the Enjoyment caused by this quality for different reasons. For every rough edge of a character that it sands down through repeated exposure and habituation, it has the potential to accidentally reveal the illusion of control that the participant has over the experience, which could potentially allow their Enjoyment of the experience to decrease over repeated play-throughs or exposures.

It is also important to note here that the responses to other interview questions often mentioned Character Believability when discussing Interactivity without prompting from the automated researcher ("It was interesting interacting with the technology and seeing how believable it could be"[P7]). Other Enjoyment questionnaire subcategories were not brought up in this way with the same frequency. This mainly occurred in the first question asked by the automated researcher, with Character Believability mentions being especially present if the researcher was asking participants to elaborate on their scoring of the pure Enjoyment measurement in the questionnaire. This is great evidence that Character Believability is a significant contributing factor to the Enjoyment felt from participants when specifically considering the interactivity of the experience.

6.2.3.4. Summary

To summarise, the qualitative analysis of the participants' reasonings behind their significant Enjoyment scores provided with a lot of detailed evidence for why Presence, Curiosity, and Character Believability contributed significantly towards the way that Interactivity influenced the participants' Enjoyment of the experience. Reasonings can be grouped into the following three categories; the similarity to a real-life video chat interaction, the similarity to an interaction with a real-life human, the feeling of being able to control or influence the direction of the conversation.

6.2.4. Narrative - Qualitative Results

I conducted another directed content analysis, with my questions being decided upon by the questionnaire responses of my participants in real-time due to the automated data collection system I had in place for the study.

To direct the analysis of the transcripts of these auto-generated follow up question answers I will use the following findings from the above quantitative analysis:

- There were many significant correlations between individual narrative steps and individual Enjoyment questionnaire items. These were mainly concerning the Enjoyment questionnaire subcategories of Presence and Optimal Task Engagement.
- There was a significant correlative relationship between narrative step and System Usability scoring, indicating that the earlier a step was in the narrative the more it influenced the scoring of this measurement.
- There were also various correlative relationships between narrative step influence and the measurements of Curiosity, Aesthetic Pleasantness and Eudaimonic Appreciation, Satisfaction of User Expectation, Autonomy, and Presence

I analysed the questionnaire sections corresponding with the seven Enjoyment questionnaire categories of interest (Presence, Optimal Task Engagement, System Usability, Curiosity, Aesthetic Pleasantness and Eudaimonic Appreciation, Satisfaction of User Expectation, and Autonomy) and examined the semi-structured interview responses for inductive codes concerning Interactivity. I then followed the same methodology as the analysis of the responses relative to Interactivity, searching the transcript of the relevant interview responses and highlighting any text relevant to the narrative of the experience and coding these highlighted sections into relevant categories and subcategories.

6.2.4.1. Presence

I analysed the interview responses for the Presence specific follow up questions and found that the main reasons for why the participants found the Presence that the experience evoked enjoyable when it came to the Narrative quality of the experience were identical to the qualitative analysis of the same Enjoyment measurement for the Interactivity element. The narrative-relevant responses to the Presence question concerned the similarity of the experience to a real-life video chat experience (“I've been doing a lot of zoom calls. I like a lot over the last few months and so this is a very familiar situation to be in.”[P2]) and it’s similarity to a real conversation (“It still felt like an organic conversation”[P7]). That the meaningful character reactions felt real and important, due to their pairing with significantly different narrative outcomes for the story, had an impact on participants and contributed to them considering the experience as having Presence, and that Presence being enjoyable (“it just felt like I was getting responses to what I was saying, which was nice”[P1]). That this Enjoyment subcategory has significant relationships with both Narrative and Interactivity is not surprising, as it is the direct intermingling of the two, that is to say the way that Interactivity influences Narrative, that drives a sense of direct or indirect consequence of the participants’ actions during the experience, inducing a sense of meaningful interaction and influence over the story outcome. This is usually only possible in nature if you and the influenced agent or environment share a reality, and therefore this interplay produces a convincing sense of Presence in the participant.

6.2.4.2. Curiosity

I analysed the interview responses for the Curiosity specific follow up questions and, once again, found the same two main reasons why participants found the Curiosity that the experience evoked enjoyable when it came to the Narrative quality of the experience as I did when analysing the interactive quality of the experience. The narrative-relevant responses to the Curiosity question tended to show an interest towards where the story in the experience was going (“I didn't know what to expect”[P11]) and which of the many possible endings would be reached on each run through (“I could feel that it wasn't going how the previous two scenarios had gone”[P8]). These responses also had a tendency to reflect on the general intrigue that conversing with a stranger evoked, particularly what their role in the story might be (“ I was interested by the world that was being developed. And the potential implications of it, and how I answered”[P20]) or how their sometimes strange behaviours might be explained in the experience’s conclusion (“There was definitely a degree of intrigue in terms of what that was relating to and why they had that reaction..”[P7]). Both of these categories of response were present substantially between and within participant answers to the Curiosity elaboration questionnaire follow up question. However, these categories being governed by the interaction relationship between Narrative and Interactivity is less clear cut compared to the Presence analyses. While, when commenting on the interactivity of the experience, participants often referenced it in relation to how Interactivity affected the narrative, these relationships seems one sided. The curiosity exhibited in these coded responses doesn’t overlap with ideas of Interactivity at all, instead focusing purely on the potentials of the narratives. These are potentially different narratives for each run through, but whether these differences in narrative were triggered or controlled by the participants themselves isn’t directly brought up in these coded responses. My results show that, although they evoke responses of equivalent categories of codes, the qualities of Interactivity and Narrative have an imbalanced relationship when it comes to influencing Curiosity in the participants, with Narrative holding a seemingly more influential role and Interactivity feeding into that occasionally.

6.2.4.3. Optimal Task Engagement

I analysed the interview responses for the Optimal Task Engagement specific follow up questions and found multiple reasons why participants found the Engagement that the experience encouraged enjoyable when it came to the narrative quality of the experience. Responses to this elaboration question tended to reference the fluidity of the system (“It was very fluid, very easy to communicate with.”[P7]), as well as having the right knowledge to be able to interact with the system with ease, either via the repetition of the experience (“It was pretty straight forward… once you understand the basics of what's going on”[P14]) or due to familiarity with the video chat scenario (“It was easy to just listen and respond.”[P22]). On initial inspection this feels more like a relationship with the interactive quality of the experience, but these responses highlight that the Enjoyment felt from Optimal Task Engagement was elicited by the way in which the narrative of the experience made the participants feel confident with engaging with the experience, and not with the method of Interactivity or experience engagement itself. Participants mentioned that their contributions felt meaningful and significant (“A lot of it was dependent upon your personal contributions. What you made. I liked that element of it.”[P20]) because of the way that the story, or narrative, seemed to respond and adapt

in response to their contribution. They also mentioned that the characters felt real and present (“pretty natural to interact with it that way”[P18]) for the same reasons. Of course, this is a misunderstanding of how the experience works, as it does not generate story in response to a participant’s behaviour but instead selects an already constructed narrative path for the story to continue along. This means that this more enjoyable, and seemingly more complex, method of Interactivity is actually a feature of both the content and the construction of the narrative, its fabula and its syuzhet (see Section 2.1.1. for definitions).

6.2.4.4. System Usability

I analysed the interview responses for the System Usability follow up questions and found similar reasons as to why participants found this quality contributory to their Enjoyment when it came to the Narrative quality of the experience compared to Optimal Task Engagement in the above paragraph. Participants mentioned the intuitive and self explanatory nature of the experience (“very simple, very clear. There wasn't any buttons to press”[P4]), with other’s elaborating and explaining how this tied into the guidance given by the character at the beginning of the experience (“very quickly after the first kind of moment where the character… invites a response you go okay, I can sense here in the moments where I need to respond”[P8]). This simple explanation of what to expect, and the slightly expositional tutorial of how to interact with the experience, were crafted so as not to take the audience out of the experience at all, and in being crafted this way are a feature of the narrative design choices made during the making of the experience. However, responses to System Usability follow up questions also included mentions of being familiar with the video chat setting of the experience (“I've become quite familiar with Zoom, so setting up was totally fine”[P6]) which did not appear during the elaborative questions concerning Optimal Task Engagement, which elicited responses more focused on the reality of the characters and not the communication system or setting. These sorts of responses were more similar to follow up questions concerning Presence and Character Believability, showing some potential overlap with these areas of the Enjoyment questionnaire, and potentially with the Interactivity element of the experience. This might only be a weak relationship (this was not a frequent mention in the System Usability responses) but perhaps there is an important consideration to be made concerning the distinction between Interactivity and Usability. While Interactivity is the neutral method of communication with the experience, System Usability is an opinion laden measure of how participants considered this feature of the experience that is actually only significantly influenced by the Narrative quality of the experience in spite of it’s intuitive association with Interactivity. If a flawlessly interactive system is entwined with a non-complementary narrative that confuses participants, the experience is not usable. Likewise, if a system consisting of confusing parts is paired with a complementary narrative that uses a clever mix of analogies and story to reframe a complex series of interactions into something less imposing, then the system is usable. Except for at the extremes of interactive complexity, System Usability actually has very little to do with Interactivity methodology and everything to do with Narrative content and execution.

6.2.4.5. Aesthetic Pleasantness and Eudaimonic Appreciation

I analysed the interview responses for the follow up questions relevant to the Enjoyment measurement of Aesthetic Pleasantness and Eudaimonic Appreciation and found, when it came to referencing the Narrative quality of the experience, there were positive and negative statements amongst the participants. Responses to this Enjoyment measure clearly varied depending on the participant's preconceived notion of what an "artwork" was and whether the experience was an experience worthy of this sort of deeper, beyond the surface, level of appreciation. The participants who disagreed that the experience was an artwork cited it as non-traditional ("wouldn't say that it was art in the traditional sense"[P20]), lacking drama ("it didn't feel like I was in a drama."[P21]), lacking gravitas ("sense of greatness"[P14]), or being non-classical ("You know it didn't feel like I was watching a Tarkovsky"[P17]). However, an important observation is that some of these participants later changed their mind and reported considering the experience more like an artwork after repeated runs through ("I was responding with a very narrow perspective as to what art is… it was artistic in its nature"[P20]) especially if they experienced different story paths during these repetitions of the experience ("Probably because I was more emotionally engaged in that one… I could see some kind of narrative arc and was immersed in it more"[P21]). This is clear evidence of these significant changes in Aesthetic Pleasantness and Eudaimonic Appreciation scoring as being derived from Narrative, as the revelation of and navigation through the multi-branching narrative changed opinion within some of the more conservatively minded participants to allow them to increase their Enjoyment of the experience in this way. Other participants who reported on increased Enjoyment for this measure referenced similarities between my experience and other types or genres of experience they perceived to be of equal artistic merit ("the science fiction bit… It felt quite playful and fun"), further solidifying the idea that preconceived notions of what is or isn't worthy of artistic appreciation drove some of these responses.

However, this was not the case for all relevant responses to this Enjoyment measure. Another positive response category consisted of mentions of how the experience made participants self reflect and look inwards ("made me think about myself there"[P19]). This ability to engage with the work and use it as a tool to consider one's self is what we might expect if the audience is regarding the experience as an artwork and, given the references to the narrative that accompanied these comments, it's clear the work is being considered artistic and enjoyable to a significant degree for its narrative properties as opposed to other qualities it contains, be they interactive, purely aesthetic, or other.

6.2.4.6. Satisfaction of User Expectations

I analysed the interview responses for the follow up questions relevant to the Enjoyment measurement of Satisfaction of User Expectations and found similar results to the Aesthetic Pleasantness and Eudaimonic Appreciation measurements, in that when it came to referencing the Narrative quality of the experience, there were positive and negative statements amongst the participants. Positive mentions of the Narrative qualities of the experience for this Enjoyment measurement condition included praise for its similarity to a real first date ("Yeah, I said it was very convincing performance and setting and everything"[P18]). These responses show the experience meeting and satisfying the participant expectations from both a simulation of real life

and dramatic naturalism perspectives, with the world feeling real in both an artistic and dramatic sense, as well as from a user experience sense. These qualities continue to echo the ideas of fabula and syuzhet, with the naturalism perspective indicating a satisfying fabula, or content to the narrative, and the simulation satisfaction indicating a satisfying syuzhet, or delivery of the narrative.

Negative mentions for this Enjoyment condition included categories of response concerning being unable to be satisfied due to the lack of experience with the novel method of the delivery of the narrative, leaving expectations of the narrative unable to be judged against a meaningful benchmark (“I think it really depends on what you know about setting”[P17]) or the perception amongst some participants that a multi-branching narrative experience will always be unfulfilling (“I think it's about like you know, is this a narrative structured thing that you're going to engage with… You know there's something satisfying in an arc”[P17]) due to a trust that a more linear narrative will inevitably be better constructed. The veracity of these claims aside, other participants argued with opposing responses, stating that the changing narrative kept the experience fresh (“I kinda went into it expecting the same and then to do something different was yeah, so it exceeded expectations”[P1]), a satisfying expectation compared to hypothetically repetitive views of a linear narrative experience. Comments concerning the Satisfaction of User Expectations also occurred in other Enjoyment measurement responses, often after later trials once expectations had a chance to be informed and created by repeat viewings of the experience, though the content of these responses did not differ from those previously discussed in this paragraph. However, these experiences did all have mentions of the benefit and Enjoyment gained by the participants from the subversion of their expectations (“There's something about the repetition as well of and kind of starting to understand the tics of this kind of character in a certain way. And then the play of subverting some of those expectations like the subverted ending was quite funny.” [P17]) brought about by the branching narrative the experience is built around. This shows how it’s not just the presence or absence of the satisfaction of expectations that is important in measuring the impact of the Narrative qualities of an experience, but also whether those expectations for the experience, either derived from prior knowledge or prior experience, were subverted in an enjoyable way or not. This is a potential feature of any experience or work, but for us, according to these responses, this was mainly due to the repeated runs through of the experience and the fact that it could be different on each run through. This feature is only feasible by using a multi-branching narrative.

6.2.4.7. Autonomy

Finally, I analysed the interview responses for the follow up questions relevant to the Autonomy Enjoyment measurement and, just like the previous two analyses, I found that, when it came to referencing the Narrative quality of the experience, there were positive and negative tinges to the participant responses. Positive mentions referenced the ability to interact with the experience in any way and for it to move the story forwards smoothly (“an easily flowing conversation in terms of the scripting and very easy and dynamic way of interacting with the piece itself”[P7]). The interactions in the experience are designed with the feeling that they are open ended, not just a choice between a small number of options, allowing the participant to feel like they can respond in any way they want and still progress meaningfully and sensibly through the story.

This is particularly applicable to the second half of the narrative, with participants being able to navigate to different endings, out of the possible 18 offered by the experience, with different audience behaviour across multiple runs through. Although the experience isn't monitoring the fine detail in the participants' behaviour, and isn't actually that detailed in its interactivity elements, this doesn't affect the perception of, and Enjoyment wrought from, the Autonomy as a result of the way that the narrative has been crafted to respond to an anticipated wide range of participant responses and behaviours. However, this was not always perfect, with negative responses referring to the narrative for the Autonomy relevant follow up questions comparing the narrative freedom to the potential of a real-life conversation and finding it lacking ("I felt like okay. I'm gonna try doing something different, and it led to the same scenario"[P8]). Limited responses from the characters to the participants' behaviour were mentioned here ("the response that the person would give was very limited"[P4]) with reduced Enjoyment born out of trying to interact differently on repeat viewings of the experience and getting the same responses as previous runs through, sometimes repeating a whole sequence of narrative steps multiple times. The first half of the narrative, the asking of the 36 questions that make you fall in love, was found to be particularly limiting in this way. To summarise, it's clear that Autonomy is a difficult quality to create in a narratively driven experience, especially for a broad and varied pool of participants. Attempting to create this feeling is a blessing and a curse because, for every participant that is granted Enjoyment from the illusion of free will provided by the branching narrative, there is a participant that can imagine further potential freedom that is absent from the experience due to the, though numerous in places, still limited number of feasible narrative branches. This is a polarising measure of Enjoyment, much like Satisfaction of User Expectations and Aesthetic Pleasantness and Eudaimonic Appreciation, where the Narrative qualities of the experience interact with a multitude of qualities from the participants themselves to encourage or inhibit the feeling of Enjoyment from the experience.

6.2.4.8. Summary

To summarise, the qualitative analysis of the participants' reasonings behind their significant Enjoyment scores provided me with a lot of detailed evidence for why Presence, Optimal Task Engagement, Curiosity, Aesthetic Pleasantness and Eudaimonic Appreciation, Satisfaction of User Expectation, and Autonomy contributed significantly towards the way that Narrative influenced the participants' Enjoyment of the experience. Reasonings can be grouped into multiple categories, three of which are the Narrative analogues of the categories found when qualitatively analysing the Interactivity responses; the choice of the familiar setting of a real-life video chat, the naturalism in the writing and execution of the performances, having meaningful and multiple directions of conversation to influence the story through. Three additional categories were found with the Narrative analysis. These include; smoothness of the user experience, preconceptions of similar experiences, and the effect of repeated experiences.

6.3. Summary and Recommendations

This analysis shows, first and foremost, that I was able to not only create an automated conversational agent whose responses felt meaningful and relevant given the participants' behaviour, but that I was able to do this with a technologically simple system, recordings of human performers, and using my design philosophy of

working smart and not working hard. Secondly, I was able to separate the Enjoyment felt by the participants into twelve different categories and analyse these individual categories to identify which Enjoyment categories would be significantly affected by the Interactive or Narrative qualities of the experience. I then explored this further and found fundamental groups of inductive codes that appeared to govern these differences in significance within and between the Interactivity and Narrative qualities of the experience, some overlapping and some unique to Narrative.

Firstly, the Catherine method of Interactivity was found to be significantly less enjoyable and live seeming than the Quantic method, meaning that the more direct and immediate method of interaction was found to be more enjoyable than the method that kept a running total of participant behaviour over time, using that to navigate through the story. The Catherine method was also significantly less enjoyable and live than the Random method, meaning that the system randomly choosing the next sensible step in the story was enjoyed significantly more often than a system that considered user behaviour. These findings create some important considerations for future experiences. Firstly, a system that immediately responds to a user seems to be the most enjoyable, which makes sense given the style of interaction and conversation within the experience. Secondly, a random selection of responses can feel more enjoyable than a system informed by participant behaviour. This goes to show that even a completely inert conversational agent that receives no input from the user can not only create an enjoyable and seemingly meaningfully interactive experience for users, but can create an experience more enjoyable than a system that is actually keeping stock of user behaviour and reacting to it over time. This is important to keep in mind for developers of interactive experiences or conversational agents moving forward, with my advice to be to encourage the use of the illusion of control and non-interactive elements of an interactive system to reduce system complexity and create, in some cases, a more enjoyable user experience at the same time.

Further analysis showed that there was a significant change in the Enjoyment scores given between the third trial, rated as more enjoyable, and an average Enjoyment score calculated from the two previous trials, with follow up analyses pinpointing this difference to be the most significant when it came to the Enjoyment measurements Curiosity and Character Believability. More detailed analysis suggested this was down to the participants having the impression that the character responded in a more thoughtful way to what they did in the final trial. However, I believe that this is actually the result of an interaction between the final trial being controlled by a different content delivery method, and therefore being potentially more likely to show different steps in the narrative path, and the participant's curiosity concerning the as-of-yet untraversed narrative paths. Regardless of their behaviour and whether it led to a different story or not, if the participant is aiming for a different response, behaves differently to try and achieve that, and then achieves it in a believable way they'll think that their change in behaviour triggered that different response, even if this was not the case. This would give us a result saying that the character felt more thoughtful in their responses, that also aligns with the idea of increased Enjoyment linking to Curiosity and Character Believability as we have observed.

Qualitative analysis of a variety of Enjoyment measurement categories and their relationships with Interactivity and Narrative showed me that there were six main categories of responses that contributed to

these significant correlational relationships for the different qualities of the experience. The three categories shared between Interactivity and Narrative were:

- Similarity to a real-life setting
- Similarity to a real-life conversation partner
- Similarity to the open ended and malleable nature of real conversation

When designing a simulated conversation, creatives might want want to concentrate on the flow and meaningful nature of the interaction, which my analysis shows are important elements to focus on. However, an equally important consideration is that the agent interacts with its setting or environment appropriately to help ensure that both the Narrative and Interactivity of the experience feel Enjoyable. The character being placed in a real-life and appropriate setting, when compared to the user, allows for more complicated and realistic feelings of Presence to manifest within the interaction, which appears to improve the Enjoyment of the interaction and makes the character feel more live, immediate, and believable. This could help to reduce the feeling of impersonality that interferes with conversation agent interactions for many users and this potential should be further researched.

Although these were the only categories relevant to Interactivity that I found, my analysis showed some categories specific to the Narrative quality of the experience. These were:

- Ease of the user experience
- Preconceptions of similar experiences
- The effect of repeated experiences

It might initially seem surprising that these categories are Narrative specific, as one might assume that all these categories would share their relevance with the Interactivity quality of the experience. However, it's important to remember that the average audience has limited knowledge about the mechanics of any experience that they interact with. Given this fact, it makes sense for the only possibly comparable feature between *GUEST* and other experiences they've interacted with in the past to be the much more obvious quality of Narrative. Also, since they would not have an awareness of the interaction system driving *GUEST*, they wouldn't be aware of the content delivery system changing between some of the repetitions of the experience. Given that a changing interaction system is uncommon in an interactive experience there is also no reason to anticipate this as happening at all, so much less impetus to comment upon the effect of repeated experiences on Interactivity when compared to the more obvious changing Narrative qualities of the experience. That the participants' thoughts about the smoothness or ease of the user experience affects their Enjoyment of the Narrative but not the Interactivity is even more initially perplexing a finding. I would suggest that this is explained by the organic aim of the interactivity of this experience, meaning that the Narrative could be seen as enjoyable or unenjoyable, but the Interactivity can only be seen as unenjoyable or as enjoyable as everyday Interactivity. If participants liked the experience interactivity it might be because the natural method of the interactivity didn't take away from their Enjoyment of the narrative, as can sometimes be the case with other less organically interactive experiences. This means that the interactivity can't have anything more than a neutral Enjoyment, as it is trying to simulate an everyday and habitual interaction process rather than trying to create a specifically enjoyable one. If this were the case, it would

explain why Enjoyment concerning the ease of the user experience was found as a category of Narrative Enjoyment but not that of Interactivity.

There was a significant correlative relationship between narrative step and the System Usability measurement of Enjoyment, specifically indicating that the earlier a step was in the narrative the more it influenced the scoring of this Enjoyment measurement. This finding also makes sense and shows that the anecdotal idea that “first impressions count” has experimental backing for this experience. We’d advise creators of similar experiences to focus resources into making sure that the initial steps and onboarding the participant experiences with your system are as enjoyable as possible, especially along six considerations as generated from the Qualitative analysis.

However, I can’t further discuss the balance of Narrative and Interactivity without a deeper look at Interactivity, which, given the nature of the research experience, requires a specific look at the way that the participants’ behaviour powered the narrative of the experience. For that reason, my second study looks at Audience Behaviour and its interaction with experience Enjoyment in a more specific way.

7. Audience Behaviour

7.1. Introduction

The previous chapter of this thesis showed how important the method of Interactivity is when it comes to the audience Enjoyment of these sorts of interactive experiences. Interactivity is, in its simplest terms, a communication between a user and an experience. The user behaves in some way, the experience responds to this behaviour, the user recognises the response and continues or changes their behaviour. This process continues until the experience has concluded. However, there was not a singular method of communication used by the audience to interact with the experience, with two types of Audience Behaviour being used to interact with the experience and drive the narrative forward; Speech Presence and Overt Attention. It was then possible to break these Audience Behaviours down even further, as different subcategories of these behaviours were used to power the experience at different places along its narrative path. This variety of Audience Behaviour modalities poses a question, namely one of whether different modalities of Audience Behaviour affect Enjoyment of an experience to a greater or lesser degree.

Our experience was powered using Speech Presence and Overt Attention. This means that, when reaching a fork in the narrative path, the decision of which fork in the path to continue to navigate the story down was made in response to some quality of one, or both, of these modalities, split into the following three values:

1. Speech Presence (SP) vs Speech Absence (SA), was the audience talking at all or not
2. Prolonged Speech Presence (SP+) vs Limited Speech Presence (SP-), was the audience talking for a long or short duration
3. Gaze Presence (GP) vs Gaze Absence GA), was the audience looking at, therefore overtly attending to, the centre of the screen of the device they were experiencing the experience through or not, be that looking elsewhere on the screen or away rom the screen entirely

Along the narrative path there were six or seven points at which Audience Behaviour could influence the story, depending on the exact narrative path taken. However, all experiences, regardless of the number of narrative steps, can be broken down into five key moments of influence:

1. The beginning of the experience

The audience is asked to close their eyes to prepare for the beginning of the experience. Depending on if they speak or not at this moment, they will be shown a different starting scene of the experience, with a different first question asked of them. Therefore, this step is controlled by Speech Presence or Speech Absence.

2. Answering the first question

The audience answers the first question that the character will ask them. Depending on the duration of their reply, they will be offered a different second question to ask the character. Therefore, this step is controlled by Prolonged or Limited Speech Presence.

3. Asking/answering the second question

The audience asks the question presented to them, listens to the response, and then responds themselves. Depending on the duration of their reply when asked to answer the question themselves, they will be asked a different final question. Therefore, this step is controlled by Prolonged or Limited Speech Presence.

4. The post-it note, decides which of the six penultimate steps are reached

The character is distracted, but eventually asks the audience a question, which is then immediately answered by the character, before they try to find a new question for you to ask them. When shown this new question, written as a purposefully long question, a post-it note is stuck to the question card. Depending on if the presence of this note interrupts the asking of the question, different paths of the story are navigated down. Therefore, this step is controlled by Speech Presence or Speech Absence.

5. The final reaction

If the final question is interrupted, the character looks at the question card, sees the note, and looks back at the audience. Depending on whether the audience holds the gaze of the character, looks away, or tries to say something, they will reach a different penultimate step in the narrative. Therefore, this step is controlled by Speech Presence, Gaze Presence, or Gaze Absence.

If the final question is asked without interruption, the character will answer it and ask you for your response. The duration of that response leads to one of two narrative path directions. One is a penultimate step. The other another story path which, depending on whether the audience looks at a bloodstain on the back of the character's shirt or not, then leads to one of two other penultimate steps. Therefore, this step is controlled by Limited Speech Presence or Prolonged Speech Presence and also either Gaze Presence, or Gaze Absence.

Once reaching either one of the six penultimate steps a final behaviour check is made of the audience. Depending on whether the audience hold the gaze of the character, look away, or try and say something, they will reach a different final step in the narrative. Therefore, this step is controlled by Speech Presence, Gaze Presence, or Gaze Absence.

Figure 7.1. shows these five key moments of influence as steps 1-5 on the flowchart showing the narrative paths that make up *GUEST.* It also shows us which Audience Behaviour modality was responsible for moving to each scene in the experience, replacing the name of the scene on the blocks of the story path from Figure 6.2.

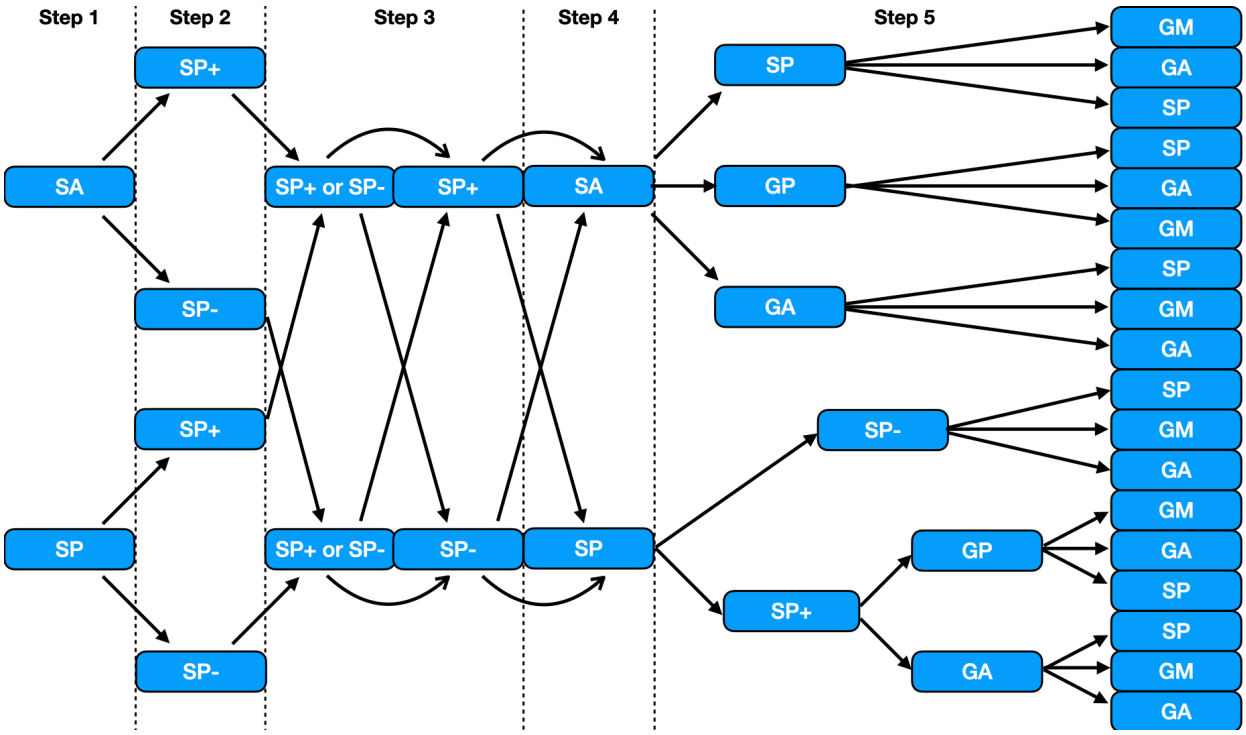

Figure 7.1.) Flowchart showing the narrative paths for GUEST, with each block labelled with the Audience Behaviour modality that leads to it being exhibited to the audience. The blue blocks are the content of the story, the fabula, with their arrangement and how one navigates between them, as shown by the arrows, being the syuzhet.

Given the combinations and permutations of ways that different Audience Behaviour modalities can influence the experience, and potentially the audience's Enjoyment of that experience, I will undertake a series of analyses to pick apart this web of interactions and investigate whether there is a relationship between Audience Behaviour modalities and audience Enjoyment. Each trial will be broken down and labelled as the proportion of its narrative path influenced by each Audience Behaviour modality. For example, if a play-through of the experience took a participant through six interaction steps, three of which were controlled by Speech Presence, two by Limited Speech Presence, and one by Gaze Absence, then that trial could be described as belonging to the 3/6 proportion group for Speech Presence, the 2/6 proportion group for Limited Speech Presence, and the 1/6 proportion group for Gaze Absence. It would also be a part of the 0 proportion groups for the other Audience Behaviour modalities, those being Speech Absence, Prolonged Speech Presence, and Gaze Presence in this instance. Once assigned these labels, the Enjoyment scores for these influence proportions will be compared to ascertain if there are any significant differences in the audience Enjoyment scores caused by these different Audience Behaviour modalities. This will be quantitatively analysed, with the results being used to direct a qualitative analysis of the participant's post-experience interview responses to further explore any significant quantitative results.

7.2. Results

The results from the previous research chapter of this thesis show that the relationship between Enjoyment and Interactivity is not a linear one, with the Random method of Interactivity, which involves no narrative selection driven by the Audience Behaviour, being rated as both significantly more Enjoyable than one behaviour driven method (Catherine) but less enjoyable than the other (Quantic). This made me want to look at the types of interaction that were used to power the experiences under the different Interactivity methods. I wanted to investigate whether there were any significant relationships between the Audience Behaviour data used within the experience and the Enjoyment scores provided by the participants immediately after having taken part in the experience.

As outlined in Sections 5.6. and 6.2., 22 participants were recruited to take part in the study via public online calls for participation. The study took place over Zoom and lasted approximately 50-60 minutes on average, during which the participant played through the experience and answered a questionnaire about their experience multiple times. Once that had been filled out, they were asked relevant follow up questions about the significant, instances or changes of scores for each Enjoyment category. These were the only additional qualitative data collection measures taken, as explained in Section 3.4.

7.2.1. Audience Behaviour - Quantitative Results

I calculated the proportion of each navigation through the story that was controlled by the Audience Behaviour modality of Speech Presence, including all durations of speech (prolonged and limited) and speech absence. There were five different discrete groups that these proportion figures fit into, with navigations through the story either being fully controlled by the modalities (6/6 paths navigated using audience speech behaviours) or having 6/7, 5/7, 5/6, or 4/6 of their navigations controlled in this way. I compared the mean Enjoyment responses for each of these five different Audience Behaviour conditions. To calculate this I ignored any trials that were controlled using the Random method of Interactivity as these trials were not controlled by Audience Behaviour but by randomly generated sensible next steps in the narrative path. A Shapiro-Wilk test was conducted for each of these Audience Behaviour groups, all of which showed adherence to normality (See Table 7.1.). Given the normal distribution of these responses, a one-way repeated measures ANOVA was conducted to look for significant differences between these scores. Since Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, $\chi^2(9) = 24.756$, $p = .003$, a Greehouse-Geisser correction was applied to the analysis. The repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean Enjoyment responses did not differ in a statistically significant way between the Audience Behaviour methods ($F(3.196, 121.441) = 2.076$, $P = 0.103$). This analysis shows that Enjoyment measurements did not vary significantly as a result of the Speech Presence Audience Behaviour modality used to influence the narrative. This also shows that these same measurements did not vary significantly as a result of the Overt Attention Audience Behaviour modality used to influence the narrative, since the proportions on the narrative path controlled by this Audience Behaviour modality

generate the same five Audience Behaviour conditions, and therefore the same result from the statistical analysis.

Data set	Shapiro-Wilk test results	Departure from normality
5/7	W(39) = 0.956, p = 0.126	Yes
6/7	W(39) = 0.959, p = 0.159	Yes
4/6	W(39) = 0.969, p = 0.345	Yes
5/6	W(39) = 0.957, p = 0.140	Yes
6/6	W(39) = 0.960, p = 0.181	Yes

Table 7.1.) Results of the Shapiro-Wilk tests for each Speech Presence influence proportion present in the experience trials influenced by Audience Behaviour data.

To further investigate this lack of significance, I conducted this same analysis with a proportion of each specific Audience Behaviour modality mentioned in Section 7.1.; Speech Absence, Gaze Presence, Gaze Absence, Prolonged Speech Presence, Limited Speech Presence, and Pure Speech Presence. Just like the above analysis, A Shapiro-Wilk test was conducted for each group within each of these Audience Behaviour modalities, with the results displayed in Table 7.2.). Given the normal distribution of the responses for the modality of Speech Absence, a one-way repeated measures ANOVA was conducted to look for significant differences between these scores.

Since Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, $\chi^2(5) = 31.085$, $p < .001$, a Greehouse-Geisser correction was applied to the analysis. The repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean Enjoyment responses were different in a statistically significant way between the Speech Absence modality groups ($F(1.892, 71.888) = 5.101$, $P = 0.010$). Post hoc analysis with a Bonferroni adjustment revealed that Enjoyment measurements were significantly different between the 1/6 proportion group and all the other proportion groups, 1/7(0.059 (95% CI, 0.04 to 0.37), p = 0.009), 2/6 (0.095 (95% CI, 0.02 to 0.55), p = 0.030), and 0 (0.053 (95% CI, 0.13 to 0.43), p < 0.001). This analysis shows that Enjoyment measurements for the group where the narrative was controlled by Speech Absence for 1/6 of the narrative path navigations were significantly lower than all other instances of Speech Absence narrative control, meaning that this amount of use for this Audience Behaviour modality was rated as significantly more enjoyable than the other amounts of use of this modality. This also shows that there was not a significant difference in the Enjoyment scores between the other Speech Absence proportion of usage conditions. Considering this, I will focus part of the qualitative analysis on looking for differences between trials with a 1/6 influence proportion and those with other influence proportions for the Audience Behaviour modality of Speech Absence.

Data set	Shapiro-Wilk test results	Departure from normality
Speech Absence Mean 1	W(39) = 0.958, p = 0.155	Yes
Speech Absence Mean 2	W(39) = 0.953, p = 0.101	Yes
Speech Absence Mean 3	W(39) = 0.968, p = 0.314	Yes
Speech Absence Mean 4	W(39) = 0.960, p = 0.185	Yes
Gaze Presence Mean 1	W(39) = 0.946, p = 0.059	Yes
Gaze Presence Mean 2	W(39) = 0.923, p = 0.010	No
Gaze Presence Mean 3	W(39) = 0.947, p = 0.065	Yes
Gaze Presence Mean 4	W(39) = 0.964, p = 0.237	Yes
Gaze Absence Mean 1	W(39) = 0.948, p = 0.068	Yes
Gaze Absence Mean 1	W(39) = 0.949, p = 0.075	Yes
Gaze Absence Mean 3	W(39) = 0.962, p = 0.214	Yes
Gaze Absence Mean 4	W(39) = 0.855, p < 0.001	No
Gaze Absence Mean 5	W(39) = 0.970, p = 0.365	Yes
Prolonged Speech Presence Mean 1	W(39) = 0.966, p = 0.271	Yes
Prolonged Speech Presence Mean 2	W(39) = 0.947, p = 0.064	Yes
Prolonged Speech Presence Mean 3	W(39) = 0.770, p < 0.001	No
Prolonged Speech Presence Mean 4	W(39) = 0.963, p = 0.223	Yes
Prolonged Speech Presence Mean 5	W(39) = 0.958, p = 0.156	Yes
Limited Speech Presence Mean 1	W(39) = 0.966, p = 0.271	Yes
Limited Speech Presence Mean 2	W(39) = 0.799, p < 0.001	No
Limited Speech Presence Mean 3	W(39) = 0.978, p = 0.644	Yes
Limited Speech Presence Mean 4	W(39) = 0.964, p = 0.235	Yes
Limited Speech Presence Mean 5	W(39) = 0.951, p = 0.090	Yes
Pure Speech Presence Mean 1	W(39) = 0.957, p = 0.140	Yes
Pure Speech Presence Mean 2	W(39) = 0.934, p = 0.025	No
Pure Speech Presence Mean 3	W(39) = 0.906, p = 0.003	No
Pure Speech Presence Mean 4	W(39) = 0.936, p = 0.029	No
Pure Speech Presence Mean 5	W(39) = 0.943, p = 0.048	No
Pure Speech Presence Mean 6	W(39) = 0.963, p = 0.222	Yes
Pure Speech Presence Mean 7	W(39) = 0.947, p = 0.065	Yes

Table 7.2.) Results of the Shapiro-Wilk tests for each Audience Behaviour influence proportion.

To answer this question for the other Audience Behaviour modalities, and due to the observed lack of normality in the mean questionnaire responses, a Friedman Test was used to find out whether or not significant differences in Enjoyment score between the proportional usages of these modalities were present. The results for this analysis can be found in Table 7.3. These results show that a significant difference exists in my data between the associated Enjoyment scores for the different proportional usages of many of the different Audience Behaviour modalities.

Enjoyment Condition	Freidman Test result	Significant?
Gaze Presence	$\chi2(3) = 8.488, p = 0.037$	Yes
Gaze Absence	$\chi2(4) = 9.328, p = 0.053$	No
Prolonged Speech Presence	$\chi2(4) = 20.052, p < 0.001$	Yes
Limited Speech Presence	$\chi2(4) = 26.348, p < 0.001$	Yes
Pure Speech Presence	$\chi2(6) = 35.286, p < 0.001$	Yes

Table 7.3.) Results of the Friedman Tests for the mean Enjoyment scores for each Audience Behaviour modality.

To explore these potential relationships further, I conducted individual Wilcoxon Signed-Ranks tests on the changes in Enjoyment scores for each proportional usage group for each Audience Behaviour modality to reveal if there were any more specific significant relationships in the Enjoyment score data changes. The results of this analysis for the modality of Gaze Presence are displayed in Table 7.4.). These results show a significant difference in the mean Enjoyment scores between 1/7 and 0 narrative path influence proportions, with the 1/7 influenced paths having a lower mean score (Mean Score = 2.5812), and therefore being rated as more enjoyable, than the 0 path influence proportion (Mean Score = 2.7867).

This is the only non-zero proportion of the narrative path with a significant difference in its Enjoyment scores compared to the 0 influence proportion, so I'll focus the qualitative analysis on looking for differences in response between trials with this influence proportion and those that weren't influenced by Gaze Presence at all. However, this result being the only significant difference could be down to the small sample sizes used to calculate the mean Enjoyment scores for the other influence proportions; 2/7, and 1/6. Considering this, I'll also focus the qualitative analysis on looking for differences between trials with these influence proportions and those without the influence of Gaze Presence.

Proportion 1	Proportion 1 Mean Rank	Proportion 2	Proportion 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
1/7	18.50	**2/7**	20.40	$Z = -0.544, p = 0.586$
1/7	21.13	**1/6**	18.43	$Z = -0.776, p = 0.438$
1/7	13.45	**0**	22.26	**$Z = -3.566, p < 0.001$**

Proportion 1	Proportion 1 Mean Rank	Proportion 2	Proportion 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
2/7	15.54	**1/6**	14.56	Z = -0.341, p = 0.733
2/7	20.75	**0**	17.93	Z = -0.920, p = 0.357
1/6	20.34	**0**	18.89	Z = -0.653, p = 0.514

Table 7.4.) Results of the Wilcoxon Signed-Ranks tests conducted on the changes in mean Enjoyment scores for each of the different influence proportion groups for Gaze Presence. Significant results, considering a Bonferroni Correction, are presented in ***bold****.*

The results of this analysis for the modality of Prolonged Speech Presence are displayed in Table 7.5.). These results show many significant differences between the narrative path influence proportions. The Enjoyment scores for the narrative path influence proportion of 0 (Mean Score = 2.8533) were significantly higher, and therefore less enjoyable, than the influence proportions of 1/6 (Mean Score = 2.2308), 2/6 (Mean Score = 2.4786), 3/7 (Mean Score = 2.6453). Looking at these results, I might also expect a significant difference to present between the Enjoyment scores of the influence proportion of 0 and 2/7 (Mean Score = 2.7244). This lack of a significant result could be down to the small sample size used to calculate the mean Enjoyment scores for the 2/7 influence proportion. Considering this, I'll carry the presumption that all instances of the Audience Behaviour modality of Prolonged Speech Presence could cause significant increases in experience Enjoyment scores into the qualitative analysis, meaning that I'll focus on the differences in interview response between the trials that are influenced by Prolonged Speech Presence and those that are not.

Proportion 1	Proportion 1 Mean Rank	Proportion 2	Proportion 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
2/7	18.83	**3/7**	18.09	Z = -0.685, p = 0.494
2/7	19.87	**1/6**	18.71	Z = -2.121, p = 0.034
2/7	20.69	**2/6**	15.88	Z = -2.190, p = 0.029
2/7	15.28	**0**	24.97	Z = -1.180, p = 0.238
3/7	21.02	**1/6**	17.71	Z = -2.480, p = 0.013
3/7	22.72	**2/6**	14.57	Z = -2.206, p = 0.027
3/7	15.92	**0**	21.81	**Z = -2.778, p = 0.005**
1/6	19.32	**2/6**	19.60	Z = -1.458, p = 0.145
1/6	16.08	**0**	21.74	**Z = -2.751, p = 0.006**
2/6	15.50	**0**	20.40	**Z = -3.801, p < 0.001**

Table 7.5.) Results of the Wilcoxon Signed-Ranks tests conducted on the changes in mean Enjoyment scores for each of the different influence proportion groups for Prolonged Speech Presence. Significant results, with an appropriate correction given the number of tests, are presented in ***bold****.*

The results of this analysis for the modality of Limited Speech Presence are displayed in Table 7.6.). These results show many significant differences between the narrative path influence proportions. The Enjoyment scores for the 1/6 narrative path influence proportion (Mean Score = 2.1154) were significantly lower, and therefore rated as more enjoyable, than the influence proportions of 1/7 (Mean Score = 2.7244), 2/6 (Mean Score = 2.7949), 3/6 (Mean Score = 2.8700), 0 (Mean Score = 2.6557). Furthermore, the influence proportion of 0 had significantly lower Enjoyment scores than the 3/6 influence proportion, rating it as significantly more enjoyable just like with the 1/6 influence proportion. I'll focus the qualitative analysis on detecting differences between the interview responses for the 1/6 influence proportion and the other influence proportions, as well as looking for difference between the 3/6 influenced and uninfluenced responses also. However, this group has small sample sizes for all proportions apart from 3/6 and 0, so this should be taken into account during the later analysis.

Proportion 1	Proportion 1 Mean Rank	Proportion 2	Proportion 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
1/7	19.97	**1/6**	18.00	**Z = -3.032, p = 0.002**
1/7	16.24	**2/6**	19.67	Z = -0.644, p = 0.520
1/7	16.66	**3/6**	21.57	Z = -1.509, p = 0.131
1/7	19.36	**0**	20.82	Z = -0.503, p = 0.615
1/6	14.55	**2/6**	21.27	**Z = -3.271, p = 0.001**
1/6	14.06	**3/6**	20.95	**Z = -3.743, p < 0.001**
1/6	14.10	**0**	22.03	**Z = -3.478, p = 0.001**
2/6	22.29	**3/6**	17.88	Z = -0.849, p = 0.396
2/6	23.00	**0**	14.78	Z = -1.290, p = 0.197
3/6	18.55	**0**	18.31	**Z = -2.933, p = 0.003**

Table 7.6.) Results of the Wilcoxon Signed-Ranks tests conducted on the changes in mean Enjoyment scores for each of the different influence proportion groups for Limited Speech Presence. Significant results, considering a Bonferroni Correction, are presented in ***bold****.*

The results of this analysis for the modality of Pure Speech Presence are displayed in Table 7.7.). These results show many significant differences between the narrative path influence proportions. The Enjoyment scores for the 3/7 narrative path influence proportion (Mean Score = 2.3718) were significantly lower than the influence proportions of 2/7 (Mean Score = 2.8154), 2/6, (Mean Score = 2.8547), and 3/6 (Mean Score = 2.8388). A similar result is also seen with the 1/6 (Mean Score = 2.4462) narrative path influence proportion, with its Enjoyment scores significantly lower than the influence proportions of 2/7, 2/6, and 3/6 too. This shows that this narrative path influence proportion was significantly more enjoyable than the other possibilities for the Pure Speech Presence modality. I'll direct the qualitative analysis to focus on differences between the 3/7 and 1/6 influence proportions and those influenced by the 2/7, 2/6, and 3/6 proportions.

Proportion 1	Proportion 1 Mean Rank	Proportion 2	Proportion 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
1/7	18.12	**2/7**	20.22	Z = -1.959, p = 0.050
1/7	21.96	**3/7**	16.50	Z = -2.220, p = 0.026
1/7	20.65	**1/6**	18.54	Z = -2.338, p = 0.019
1/7	14.91	**2/6**	20.08	Z = -2.666, p = 0.008
1/7	17.31	**3/6**	21.35	Z = -2.303, p = 0.021
1/7	19.08	**0**	19.88	Z = -0.392, p = 0.695
2/7	20.52	**3/7**	15.69	**Z = -3.556, p < 0.001**
2/7	19.63	**1/6**	11.50	**Z = -3.866, p < 0.001**
2/7	19.74	**2/6**	19.31	Z = -0.508, p = 0.612
2/7	20.72	**3/6**	19.38	Z = -0.237, p = 0.812
2/7	20.84	**0**	15.88	Z = -0.991, p = 0.322
3/7	20.53	**1/6**	18.83	Z = -0.909, p = 0.363
3/7	12.28	**2/6**	22.32	**Z = -3.902, p < 0.001**
3/7	10.61	**3/6**	22.26	**Z = -3.992, p < 0.001**
3/7	14.59	**0**	18.20	Z = -2.179, p = 0.029
1/6	13.89	**2/6**	21.83	**Z = -3.699, p < 0.001**
1/6	13.73	**3/6**	22.46	**Z = -3.337, p = 0.001**
1/6	16.46	**0**	20.38	Z = -2.079, p = 0.038
2/6	21.92	**3/6**	18.18	Z = -0.370, p = 0.711
2/6	19.67	**0**	19.21	Z = -1.473, p = 0.141
3/6	22.02	**0**	17.64	Z = -1.013, p = 0.311

Table 7.7.) Results of the Wilcoxon Signed-Ranks tests conducted on the changes in mean Enjoyment scores for each of the different influence proportion groups for Pure Speech Presence. Significant results, considering a Bonferroni Correction, are presented in ***bold****.*

7.2.2. Audience Behaviour - Qualitative Results

As discussed previously in this thesis (see Section 6.2.3.), I conducted a directed content analysis (Potter & Levine-Donnerstein, 1999), except where open ended questions are usually decided upon under the influence of previous theory and research (Hickey & Kipping, 1996), my questions were decided upon by the responses of my participants in real-time. The live questionnaire answers from each participant were used to generate immediate and relevant follow up questions that I can analyse the answers to in order to help further

understand the relationship between Audience Behaviour and Enjoyment. More details about this methodology can be found in Section 8.1.

To direct the analysis of the transcripts of these auto-generated follow up question answers I will use the findings from the above quantitative analyses. The significant findings are:

- The Gaze Presence 1/7 influence proportion was more enjoyable than the 0 proportion. The 2/7 and 1/6 influence proportions may also be more enjoyable than the 0 proportion.
- The Prolonged Speech Presence 1/6, 2/6, and 3/7 influence proportions were more enjoyable than the 0 proportion. The 2/7 influence proportion may also be more enjoyable than the 0 proportion
- The Limited Speech Presence 0 influence proportion was more enjoyable than the 3/6 proportion. The 1/6 proportion may also be more enjoyable than both the 3/6 and 0 promotions, as well as the 1/7 and 2/6 proportions
- The Pure Speech Presence 3/7 and 1/6 influence proportions were more enjoyable than the 2/7, 2/6, and 3/6 proportions
- The Speech Absence 1/6 influence proportion was more enjoyable than other proportions

Having labelled the transcript of each interview response for each participant, for each trial, with the relevant Audience Behaviour modality proportions for that trial, I analysed the questionnaire responses corresponding to the trials that expressed each influence proportion and examined the semi-structured interview responses for deductive codes concerning each of the Audience Behaviour modalities. I then followed the first strategy for a directed content analysis presented by Hsieh & Shannon (2005); searching the transcript of the relevant interview responses for, and highlighting any text that appears to correspond to, each of my Audience Behaviour modality codes. This highlighted text then underwent further inductive coding into new categories to allow for a comparison between narrative path influence proportions of each Audience Behaviour modality.

I analysed the interview responses following the trials corresponding to a 1/7 Gaze Presence influence proportion and found three main reasons why audiences found these trials enjoyable. Participants referenced their own behaviour when describing their general Enjoyment of the experience (“the way that there was reactions to what I said and how I acted”[P16]). They also directly referenced the parts of the experience where gaze controlled the narrative path when describing the sense of suspense (“there was little glimmers of moments where there was clues. Like I said before with the post-it note and there's something on her back… it felt like there was something about to happen and I felt a bit on the edge of my seat”[P22]) and referenced the way they considered the gaze detection system to work when describing the ease of use of the system (“I think it was quite straight forward with, with the interaction part…it's doing other things. Magic behind the scenes. Obviously there's an eye gaze thing”[P22]). These same three categories of response (their own behaviour, gaze controlled experience sections, the gaze control system) were also referenced by participants for the 0 Gaze Presence influence proportion. When referencing their own behaviour, participants mentioned a lack of responsiveness (“It wasn't actually tracking my eyes”[P15]) and lack of a feeling of freedom of choice (“it seemed the same for me all the way through [even though] I clocked what happened the first time so I've changed where I was looking the second time”[P19]). The feeling of a lack of responsiveness was

also present when participants referenced the gaze controlled sections of the experience (“the same thing would happen each time, no matter what… at the point where I did look at the notes, it felt like I had to look at the notes because that was almost centre screen”[P15]) and the gaze control system (“it was Wizard of Oz-ing the tech… it was just my initial impression that that the tech was like, it didn't really work”[P15]). These negative versions of the Enjoyment measurements were only present for the 0 influence proportion, with the other influence proportions having no Gaze Presence relevant negative comments in their participant responses. In fact, there was a participant response that said the experience didn’t feel responsive apart from the instance of Gaze Presence that they identified (“I can’t see any correlations between what I was saying and what it was doing… apart from the end when she turned round and showed something on her back and, I must say, I glanced at it and this system saw that”[P19]). In summary, the three main reasons for this Gaze Presence difference are the codes of:

- Referencing Own Behaviour
- System Control
- System Mechanics

I analysed the interview responses following the trials corresponding to a 1/6, 2/6, and 3/7 Prolonged Speech Presence influence proportions and found two main reasons why audiences found these trials enjoyable. Participants referenced the way that the system was controlled by their speech, much like the gaze control system mentions in the previous paragraph, when discussing the Liveness and immediacy of the experience (“I think the way it setup does quite a good job of kind of responding with relative immediacy”[P6]), as well as how responsive it felt (“It was very reactive to me… The moment that happened there was a reaction as to that moment so that for sure seemed interesting”[P7]). They also referenced a new category of code concerning the realism felt with the simulated interaction, characterised by uses of phrases concerning the flow or fluidity of the interaction, or comments about how normal, natural, organic, or like an actual conversation the experience felt. These codes were referenced most often when describing the ease of use of the experience (“I mean there was just talking… interacting normally.”[P19]), as well as the Liveness (“it did feel a little bit like a natural conversation flowing.”[P13]) and responsiveness (“it felt responsive because there wasn't really a lag between the conversation. It flowed quite well”[P6]), just like the code category concerning the system control. This was not the case when analysing the interview responses following the trials corresponding to the 0 influence proportions for Prolonged Speech Presence. The only significant code category found was that of system control, which did not have any specific relationship with any particular negative response concerning an Enjoyment subcategory. In summary, the two main reasons for this Prolonged Speech Presence difference are the codes of:

- System Control
- System Realism

I analysed the interview responses following the trials corresponding to a 0 Limited Speech Presence influence proportion and found two main reasons why audiences found these trials enjoyable. Participants referenced codes relating to the same realism of experience category as the above paragraph when discussing the Liveness of the experience (“It felt believable that it was a fluid conversation”[P7]). A new code category was present in these responses, namely that of the quality of the interaction between the user and the

character in the experience. This was also referenced when describing the Liveness of the experience ("allows you enough time to talk and to feel like you're being listened to."[P6]), as well as within descriptions of the experience's responsiveness ("It was very reactive to me, asking generally about the notes… that for sure seemed interesting."[P7]) and overall enjoyability ("Well, it was fun. It just felt like a normal conversation which was very enjoyable."[P1]). Similar to the above Prolonged Speech Presence analysis, this was not seen when analysing the interview responses following the trials corresponding to the 3/6 influence proportions for Limited Speech Presence, with system control being the only significant code category, again having no specific relationship with any particular negative response concerning an Enjoyment subcategory. In summary, the two main reasons for this Limited Speech Presence difference are the codes of:

- System Realism
- Interaction Quality

I analysed the interview responses following the trials corresponding to a 3/7 and 1/6 Pure Speech Presence influence proportion and found one main reason why audiences found these trials enjoyable. 77% of codes were within responses concerning the ease of engagement Enjoyment subcategory, for the major code groups of system realism ("I went into the natural kind of process of of interacting as if it was a person on the other side of the screen"[P22]) and references of their own behaviour ("Ultimately it is your responses that influences what happens"[P20]), plus the minor code groups of system control ("very clear junctions in the conversation of when to interact"[P18]), and interaction quality ("Talk about these usually so mundane things, then very strange things as well."[P3]). Compare this to the other influence proportions for Pure Speech Presence, where every previously mentioned code group was present but without any strong relationship towards Enjoyment subcategories. In summary, the main reason for this Pure Speech Presence difference is not a code, but the Enjoyment quality of Engagement.

I analysed the interview responses following the trials corresponding to a 1/6 Speech Absence influence proportion and found one main reason why audiences found these trials enjoyable. Similar to the Pure Speech Presence influence proportion analysis, 86% of codes were within responses concerning Enjoyment concerning the ease of engagement with the experience. Again, these references were found in the major code groups of system realism ("it felt pretty natural to interact with"[P18]) and references of their own behaviour ("A lot of it was dependent upon your personal contributions"[P20]), plus the minor code groups of system control ("your responses that influences what happens"[P20]"), and interaction quality ("very engaging, sort of situation behind a first date… very involved"[P3]). Compare this to the responses for the other Speech Absence influence proportions, where every previously mentioned code group was present but without any strong relationship towards Enjoyment subcategories, apart from perhaps the interaction quality group and mentions concerning the Enjoyment subcategory concerning experience responsiveness ("I can sense here in the moments where I need to respond. So it was quite intuitive to use"[P8]). In summary, the main reason for this Pure Speech Presence difference is not a code, but the Enjoyment quality of Engagement.

However, there is another factor that explains some of these significant relationships between the influence proportions of different Audience Behaviour modalities. These participant interview responses were not just labelled with codes and their influence proportion, but also with the interaction method used to navigate their story paths. I did this to identify and remove the random trials from my analysis, given that they were not controlled by the audience's behaviour at any point. However, this has allowed me to see some significant relationships between the remaining Quantic and Catherine trials and this analysis, specifically that the statistically significant differences between the Prolonged Speech Presence and Limited Speech Presence influence proportions could be a result of this previously identified significance between interaction method and could have nothing to do with the Audience Behaviour modality engaged in. As it happens, all the non-Random trials that were found to be significantly more enjoyable (the 1/6, 2/6, and 3/7 influence proportions for Prolonged Speech Presence and the 0 influence proportion for Limited Speech Presence) were controlled with the Quantic method, while all the significantly less enjoyable non-Random trials (the 0 and 2/7 influence proportions for Prolonged Speech Presence and the 3/6 influence proportions for Limited Speech Presence) were controlled by the Catherine method. Therefore it is likely that these significant differences in Enjoyment score are a result of the interaction method used to navigate the narrative path for these experience trials and not the Audience Behaviour that influenced this interaction process. However, this is not the case for the significant results seen concerning the Gaze Presence, Pure Speech Presence, or Speech Absence modalities of Audience Behaviour.

7.3. Summary and Recommendations

The results from our initial quantitative analysis show that Audience Behaviour does not have a significant effect on experience Enjoyment. However, when more specific relationships between Audience Behaviour modalities are explored we find significant differences that allow us to help shed light on key considerations for designers of Audience Behaviour driven experiences in the future.

Differences in the Enjoyment of trials with varying Gaze Presence were mediated by three main factors; audiences referencing their own behaviour, the moments of the experience controlled by Overt Attention, and the system that controlled the experience using Overt Attention. This shows that, when reflecting on whether they liked the experience they had just taken part in, audiences primarily thought about how they had behaved during the experience, as well as the way that that may have affected the content and the assembly of the content of that experience. This first factor shows self reflection happening as a result of the experience. This could be because audiences that had their experience powered by this modality of behaviour would have received scenes in the story that reference this behaviour explicitly, not just that it was noticed but that it had an impact on the way the story had played out. They may then have replayed the experience, behaved differently, and experienced a change in the narrative as a result of this behavioural change. This referencing of the Audience Behaviour for this modality could very well be the reason why the audience's self reflection played a significant part of their Enjoyment of the experience. This result shows that, if creatives want to ensure the audience to self-reflect on their behaviours as a part of the user experience design of their interactive narrative, and to do so in a way that helps them enjoy the experience

simultaneously, they should include direct provocations from the experience for audiences to do this and allow them opportunity to change this behaviour and see the results of that change on the characters or story. These last two factors overlap quite nicely with the ideas of fabula and syuzhet as previously discussed in this thesis (see Section 2.1.1.). Though uncommon ideas outside of academic circles, given that some concept or distinction between enjoying a story because of the fabula or the syuzhet has appeared in the audience results shows the importance of considering these two qualities of a story if multifaceted audience Enjoyment is an aim of the story that a creative wishes to tell. It's interesting to see these two qualities of a narrative experience being considered by our participants when it comes to their Enjoyment of the Audience Behaviour driven experience, as it helps reinforce for creatives the importance of considering these two qualities when crafting and presenting their own narrative experiences.

Differences in the Enjoyment of trials with varying Speech Absence and Speech Presence were mediated by a variety of factors that predominately affected the Enjoyment subcategory of Engagement. Given that the moments of narrative path influence that are affected by these Audience Behaviour modalities are right at the beginning of the experience, and during the inciting incident of the story where the drama begins to occur, this could indicate that these are the moments in the experience that the audience gets the most Enjoyment from when engaging with them, especially since Engagement wasn't present in such a significant way with any other Audience Behaviour modality. This is useful to know because it reinforces the importance of this moment of a story for creatives in engaging an audience and getting them enjoying the experience from the get go. This part of a story is where, having had the world and characters set up and explained, the drama begins to happen and the audience's journey through the story begins to pick up pace. However, this could also be because the participants we used are from a western storytelling culture where this is the point in a story that tends to be the most engaging, so maybe they engaged with this moment of the story, and therefore had their Enjoyment mediated by these Audience Behaviour modalities, more because an expectation was fulfilled rather than because a quality of the narrative alone caused them to. Either way, creatives should continue to consider the importance of this moment in their interactive narratives when engaging an audience in an enjoyable way.

Differences in the Enjoyment of trials with varying Prolonged Speech Presence and Limited Speech Presence appeared to be mediated by three main factors between them; the system that controlled the experience using variants of Speech Presence, the realism of the simulated experience, and the meaningfulness of the interaction. However, as discussed above, this is likely to be an observation governed by the Interactivity method powering the experience and not the Audience Behaviour modalities themselves, especially since if this were the case it would align with our results from Chapter 6. In spite of this, these patterns are still present in the participant responses and so these results still highlight important elements to consider when developing these sorts of experiences. The fact that these factors focus more on the back and forth between the audience and the system makes sense, given the back and forth nature of a spoken conversation. This makes further sense when considering that this back and forth communication is a quality that wouldn't necessarily exist in the gaze or attentional relationship between two individuals in a video chat mediated social interaction, at least not as obviously or consciously. Creatives should keep, not just the Audience Behaviour modality in mind when creating experiences powered by this type of data, but whether this

behaviour is noticed or not as a part of the experience, or concisely noticed by the characters in this simulated chat style of experience. Similar to the results concerning Gaze Presence, there is clearly an impact on Enjoyment as to whether the character in the experience is aware of the Audience Behaviour powering the experience, so creatives should carefully consider the position of the audience in the story and the way in which characters or events in the story react meaningfully or arbitrarily to their behaviour during their time in the experience.

To conclude, Audience Behaviour does not significantly affect the audience's Enjoyment of the experience to the same extent as Narrative Quality or Interactivity Method. However, the effect of a mixture of Audience Behaviour modalities can't be ignored as they combine to create a multifaceted interactive experience that begins to approach something similar in consideration to a real-life interaction. It should be noted that various categories of codes were brought up with regularity in my qualitative analysis of my participant responses which are all helpful to consider when creating these sorts of experiences driven by Audience Behaviour. The six codes that came up repeatedly in the audiences' responses, and the only ones that came up at all, were:

- Referencing Own Behaviour
- Referencing Character Behaviour
- System Control
- System Mechanics
- System Realism
- Interaction Quality

This could be turned into a series of prompts for a designer of these experiences to consider during the planning and production process, in addition to those already mentioned in this summary. What will the audience think about:

- Themselves when they self reflect after the experience?
- The character(s) they interact with when they reflect on the experience?
- The inner workings of the system that controls the experience?
- The sections of the experience they are presented with, and those that they are not offered?
- How similar is the experience to their real life and how easy is it to navigate through with intention?
- How meaningful are their interactions, and how much control or influence do they have over their fate?

But it isn't just the experience that the audience interact with during my research, as the experience is also run by an automated research assistant that is powered using the same interactive storytelling system as the experience itself. Given what I now know about Narrative and Interactivity, I'll now look at whether Enjoyment varies when the exact same system, with interactions powered by the same Audience Behaviour, is used in a non-narrative interactive setting.

8. Automated Researcher

8.1. Introduction

One of the benefits of basing your research in practice is how that initial decision allows you to approach each stage of the research process. For example, *GUEST* is something that could see future release and exhibition rather than just being staged for the data collection process. This creates an interesting obstacle because, as a practitioner, I want my work to be seen by as many people as possible, but the experience as it was initially conceived was to be puppeteer by a live operator. This would limit *GUEST*'s ability to be experienced on-demand, regardless of the schedule of the experience operator. An on-demand experience reduces running costs, allows for faster and smoother updating of the experience, and is generally the most future proof solution for producing digital theatre It is this thought, potentially unique to a practice based approach, which led me to consider the following. If automation increases scalability of the experience, an automated researcher increases scalability of the research being conducted. The question then became could an automated researcher be constructed that would allow for the experience and surrounding research to be able to be run theoretically without a human operator.

Scalability would not be the only benefit of this approach. A pre-recorded researcher would help maintain uniformity throughout my research that a human researcher might not achieve (an important quality explored further by Al-Natour, 2011). This would be useful for the briefing, debriefing, calibration, and questionnaire and interview delivery elements of my research. It would also be easy to implement for this research project given that the engine already designed to run the experience could also easily run the automated researcher. This would allow the automated researcher to be comprised of linear sections of footage of a real human researcher, such as that seen in Figure 8.1., that could then be played when appropriate in response to the structure of the study and the responses of the participant, listening for specific durations of pauses in participant spoken responses to determine when answers to the researcher's questions had been given. The use of a real human recording could also help the automated system feel more comfortable and user friendly, compared to other automated response systems. The performer playing the researcher can engage in a number of performative social techniques that imply engagement and active listening concerning the responses of the participant, such as maintaining eye contact with the camera, nodding and smiling along, and tilting their head. These elements should help make the automated system feel more like a responsive and thoughtful human and less like the simple, limited and unintelligent automated process that it is. Previous research shows me that these sort of considerations might achieve what I want them to (van Pinxteren et al, 2020) so I have specifically checked for these in my results.

Figure 8.1.) Footage of the Automated Research Assistant used to conduct the research, created by recording the researcher conducting all necessary elements of the research and having the system that controlled GUEST deliver the right pieces of researcher dialogue at the appropriate moments.

This automated researcher system also has the benefit of inhabiting that midpoint between a questionnaire and interview, a kind of embodied questionnaire, which allows for the meaningful automation of qualitative research, which can be hard to achieve otherwise. The style of response this system delivered, asking follow up questions to particularly interesting questionnaire responses (see Section 3.4.), allows me to do two things. Firstly, it allows for qualitative elaboration on potentially significant quantitative data to be requested immediately and automatically from the participant. Secondly, it encourages the participant to elaborate more on their answer by requesting that they speak their response rather than writing it down, which should hopefully lead to longer and therefore more detailed elaborations with a high level of useful qualitative data in them. This automated semi-structured interview process delivered by the automated researcher allows for an automatically flexible, and massively scalable, qualitative research approach to be achieved.

However, the automated researcher is not suited for everything. I attempted to have the researcher read out post-experience the questionnaire to the participants in some of the prototyping stages of the system and this was found to be, for lack of better phrasing, long and tedious. This was particularly impedimentary to this research as I was measuring audience Enjoyment and I didn't want an unenjoyable data collection process to negatively impact the validity of the data I was collecting. I ended up delivering an onscreen questionnaire to the participants, the results of which, when submitted, could be read and responded to appropriately by the automated researcher. It is clear that not every part of the data collection needs to be automated in this way. I might also want to automate interviews over questionnaires because this study is ultimately exploratory in parts of its nature, and open ended interview questions can help me gather more of this sort of qualitative data than a questionnaire ever could. This is why my balance of questionnaire and interview questions works

so well. A traditional study run in the automated or remote way that I'm running mine might just offer a questionnaire and then try and infer information about the participants at a later date from the results received, whereas my system can detect the same patterns of results a researcher would use to infer conclusions from and ask immediate, directed, and open ended follow up questions to gather data about those potential inferences without the need for further research, either after the fact or as an additional study. This increases the efficiency of the study and means that more knowledge can be gathered from the same piece of research.

The automated researcher could hypothetically run fully automatically, but for the ease of this study it was run as a semi-automated Wizard of Oz style system, where a human operator helped guide a partly automatic system. However, these human controlled elements were all designed to be easy to replace with automation in a future iteration of the system. The automated researcher operated in the following ways:

- Firstly, it had the Speech Presence recognition system from the research experience, which allowed it to listen to participants' responses to its questions and determine when they had finished speaking before moving on to the next question or instruction.
- The automated researcher also considered information about the conditions of the trial or the previous behaviour of the participant before making these choices on which next section of the study to present. For example, if the trial being undertaken was one that required some information to be withheld, then the system would recognise that and that piece of explanatory footage wouldn't be shown, with a different but equally appropriate piece of footage being shown instead.
- Another example includes not explaining the way to interact with the experience more than once by recognising the participant as having interacted with it at least once before, and skipping the instructional segment before exhibiting the experience to them for a second or third time.

Elements of the automated researcher that were puppeteered by a human operator include the responses to the questionnaire items. Currently these are submitted to a spreadsheet that the operator monitors and then uses to identify which responses are significant or significantly different to previous responses. A significant response is determined as a response that is either initially a strong preference on the Likert scales used to measure questionnaire responses (e.g. Strongly Agree or Strongly Disagree). A significantly different response is determined as a strong change in preference within a response or category of responses, determined by a jump of two or more points on the Likert scale (e.g. a second run through of the experience generating an Agree response when a previous run through generated a Disagree response to the same questionnaire item). A jump of two was chosen because this is the jump from a neutral response (Neither agree nor disagree) to a strong response (Strongly Agree or Strongly Disagree) on the five point Likert scales my questionnaires utilised. The operator then triggered the playing of a follow up interview question depending on the presence of these significant differences, or the beginning of the next trial when there were no more follow up questions to be asked. However, there is no reason that this monitoring and comparison of responses, and the playing of appropriate follow up questions, could not be automated in future versions of this system with a fairly simple piece of code that could identify significant responses, or significant changes

of responses, and then trigger the appropriate follow up questions, as well as the automatic moving on to the next stage of the research once these selected questions had been exhausted.

The automated calibration set-up was also assisted by a human operator for this study. The automated researcher asked the participants to look at a position they indicated on the screen with their finger and to hold their gaze there for a number of seconds. When they did so, the researcher would click on the equivalent position on their screen, triggering the gaze detection software being used to link that screen position with that gaze behaviour from the participant. This calibrated the gaze detection for the participant accurately enough for the purposes of this study and could be easily automated for future versions of the automated researcher system. The automated researcher then asked the participant three questions to help calibrate the Speech Presence detection system, one anticipating a short answer ("Which town or city are you currently living in?"), one a long answer ("Describe a classroom from your childhood"), and one an answer that might require some thought ("What is your favourite film?") which involved the researcher monitoring the time it took for the volume detection system to return back to detecting just the background noise volume in the participant's environment after detecting the participant's speech, usually a second or two after the participant had stopped speaking. The operator then pressed a button to set a trigger volume that would be reached one or two seconds after the participant had finished speaking for the system to use to predict that the participant had stopped delivering an answer. Again, this calibration step can be automated in future versions of the system by having the clicking of the cursor on the correct position of the screen executed automatically on a timer, as well as the background noise level of the participant's environment being detected automatically.

The last few parts of the study that the human operator controlled were the ending of the experience itself, where they decided whether to navigate the participant to the questionnaire and interview section or to proceed straight to running through the experience a second time. They also controlled skipping a small part of the introduction depending on which series of trials the participant was going to experience, as different parts of the introduction were relevant to different trial combinations. The operator also had an emergency pause button, which would cause the system to pause and not respond prematurely if a participant was not yet finished with answering a question. However, this was rarely used and finer tuning of the system as it already stands would remove any frequent necessity for this button in fully automated future versions by monitoring participant noise levels directly after a new scene has begun playing to catch if a response had been interrupted and either pausing to allow for further response or lengthening the pauses in future participant response steps in the system.

A more detailed description of the entirety of the automated researcher system, including where automation and operator assistance currently exists, can be found in the flowcharts below. For Figure 8.2., Figure 8.3., and Figure 8.4., the blue scenes are automatically experienced, with the yellow scenes currently manually controlled in some way that can be automated in a future version of the system as outlined above. The green scenes represent a loop, where the IN sections lead back into the OUT section in Figure 8.3. The black line is the usual route through the scenes. The red line shows the route through for the half of the participants where a practice run through of the experience was offered. In Figure 8.3., the pink scene contains finer detail,

viewable in Figure 8.4. The yellow line shows the route taken after the third and final presentation of the experience for every participant. In Figure 8.4., we see the interview and questionnaire section, the pink box in Figure 8.3 in more detail. The green line is the route through the scenes for the first interview section every participant undergoes. The lines that link back into the same box that they originated from, third and fifth from the top on the right of the diagram, represent the repetition of this element of the follow up interview process, which could happen as many times as necessary before continuing along the system path in Figure 8.3.

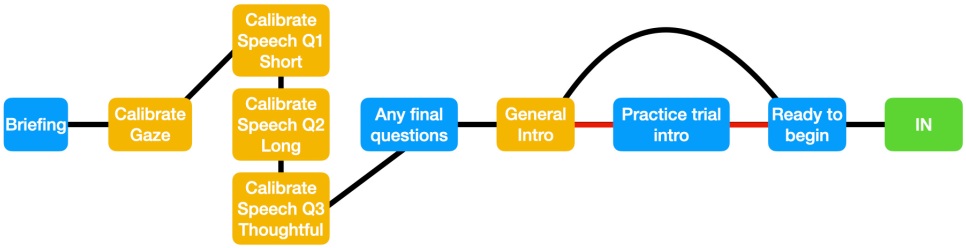

Figure 8.2.) Flowchart outlining the automated researcher's scenes for the beginning of the study.

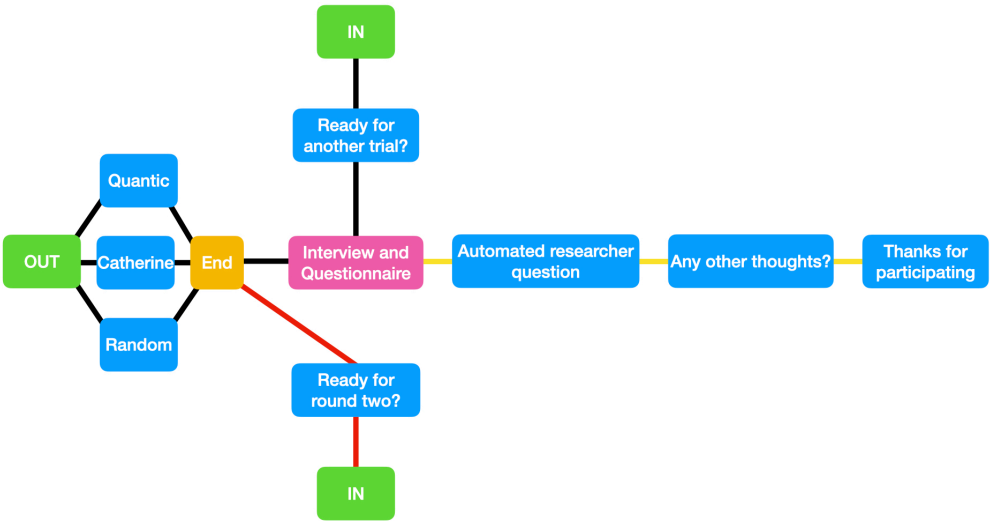

Figure 8.3.) Flowchart outlining the automated researcher's scenes for the experience exhibition and follow up questions.

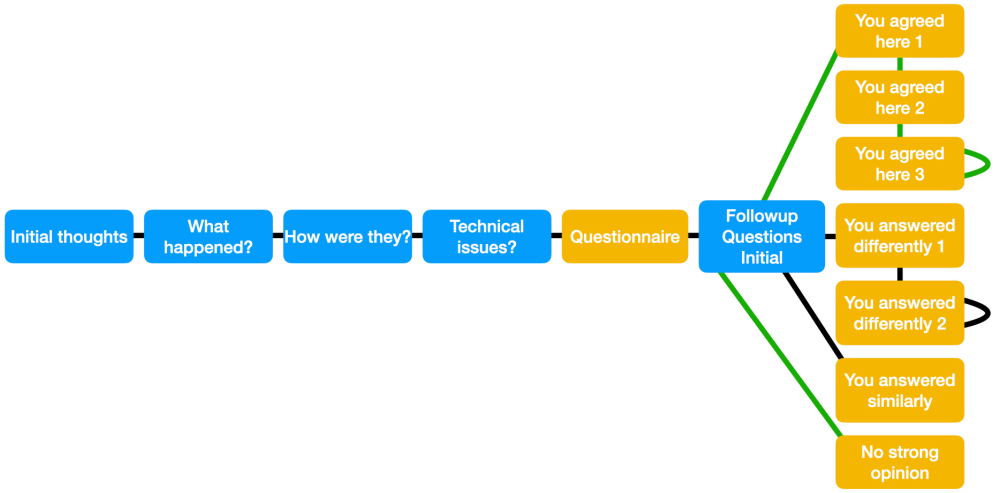

Figure 8.4.) Flowchart outlining the automated researcher's scenes for the interview and questionnaire section in more detail.

The questions I have about this system are mainly exploratory in nature. Essentially, I want to know what participants think about this system; put simply, did they like interacting with the automated researcher or not? I am also interested in whether they consider the experience of interacting with the automated researcher similar to interacting with a human agent or an automated agent on an innate level, that is to say whether they are convinced of the Liveness, immediacy, and human nature of the automated assistant or whether their brains find the similarities to a human conversation frustrating, or awkward, or perhaps as belonging in the uncanny valley of human-like system that are off-putting due to their almost-but-not-quite similarity to a believable, real human being (Mori, 2012). Lastly, the participants were greeted by a human researcher before the study began, and were aware that they were being monitored by this same researcher throughout the study. I was interested to see if the participants compared this human researcher to the automated researcher (N.B. the automated researcher is performed by the researcher, so visually and audibly these are identical conversational agents). This would allow me to see if, having interacted with a real human, whether they desired to return to that way of interaction when faced with the automated system or not.

I am also interested, in elaboration on any of the participants' responses to this question, which elements of this experience are the reasons for this feeling. I can gather all this information with the implementation of a single question, asked at the end of the whole study. Having the automated researcher directly ask the participant "How have you found talking to me today?" allows me to receive a large range of different responses that I can then analyse qualitatively, as well as breakdown into quantitative values for statistical analysis. A single question means that the same response can be analysed in a series of different ways, as described in the previous sentence, allowing a practice based mixed analysis that flows between qualitative and quantitative analytical practices to inspire each other while always considering the exact same data set.

To summarise, the research was conducted by an automated version of the researcher, filmed and edited together before the research began to guide the participants through the experience, questionnaires, and semi-structured interview sections. The participants were greeted by the human researcher at the beginning of the study, before being handed over to the automatic researcher for the study's duration. They were then handed back to the human researcher for a debrief and to answer any final questions. I wanted to know what participants thought about this automated researcher.

8.2. Results

8.2.1. Presence Quantitative Analysis

At the end of the study, the 22 participants are asked to give an opinion on the automated researcher. This spoken response was broken down into quantitative values measuring the presence of three types of response:

1. Opinion of the automated research assistant (positive, negative, or mixed/neutral)
2. Whether they referenced the automated researcher as human or not
3. Whether they mentioned knowing the researcher performing as the automated researcher

1 - If participants mentioned only positive feedback they were given a value of "1", if participants gave neutral or mixed feedback they were given a value of "0.5", if participants gave purely negative feedback they were given a value of "0".

2- If they talked about the automated researcher as if they were a real person, either by responding directly to them or by referring to them as "you" or "he" rather than "it" they were given a score of "1". If not, they were given a score of "0".

3- Although all the participants were aware of the human researcher at the start of the study, if they mentioned being aware or knowing the human researcher in response to this question, such as comparing the real and automated versions of the same researcher, they were given a score of "1". If not, they were given a score of "0".

A Shapiro-Wilk test was conducted for each of these responses, all of which showed a significant departure from normality ($W(22) = 0.778$, $p < 0.001$; $W(22) = 0.522$, $p < 0.001$; $W(22) = 0.561$, $p < 0.001$). Due to this, these values were compared using Wilcoxon Signed-Ranks tests to look for any significant relationships between these reported values, the results of which can be seen in Table 8.1.

Response 1	Response 1 Mean Rank	Response 2	Response 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
Automated Researcher Opinion	11.00	Humanlike System Opinion	7.23	**Z = -2.680, p = 0.004**

Response 1	Response 1 Mean Rank	Response 2	Response 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
Automated Researcher Opinion	8.25	Performer Prior Knowledge	9.23	**Z = -2.126, p = 0.040**
Humanlike System Opinion	4.00	Performer Prior Knowledge	4.00	Z = -.378, p = 1.00

*Table 8.1.) Results of the Wilcoxon Signed-Ranks tests conducted on the three automated researcher response types. Significant results are presented in **bold**.*

This shows me that there are significant differences between the participants' opinions about the automated researcher and both how humanlike the system felt and whether the participants mentioned the human researcher. However, this feels like a design flaw, due to the "0.5" data points in the automated research preference data set. This was corrected, with only positive feedback given a value of "1" and any other feedback, negative, mixed, or neutral, given a value of "0". Table 8.2. shows the results of these adjusted tests.

Response 1	Response 1 Mean Rank	Response 2	Response 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
Automated Researcher Opinion	4.00	Humanlike System Opinion	4.00	**Z = -1.890, p = 0.125**
Automated Researcher Opinion	6.50	Performer Prior Knowledge	6.50	**Z = -1.155, p = 0.388**

*Table 8.2.) Results of the Wilcoxon Signed-Ranks tests conducted on the newly binary automated researcher response type (Automated Research Opinion). Significant results are presented in **bold**.*

These results show no significant differences in the ratings between any of the three response types. To further examine this I conducted a series of McNemar tests, now an option given my completely binary datasets. The McNemar tests further confirm that there is no significant difference between automated researcher preference and human likeness ($p = 0.125$ (2 sided)), automated research preference and researcher prior knowledge ($p = 0.388$ (2 sided)), or human likeness and research prior knowledge ($p = 1.000$ (2 sided)). Put simply, this shows that neither the participants' opinions on how humanlike the automated researcher was, nor their prior relationship with the researcher the automated researcher was based on, has a significant impact on their Enjoyment of the automated researcher. This is positive to know, as it shows that variations in the participants' Enjoyment concerning the automated researcher weren't significantly caused by factors specific to this study, further strengthening my eventual results. However, further analysis is necessary to understand why participant's had differing opinions about the automated researcher.

8.2.2. Summative Content Analysis

Further qualitative analysis took place to investigate the differing of participant opinions concerning the automated researcher. This initial quantification of the qualitative data, in the above paragraph, resembles a manifest content analysis (Potter & Levine-Donnerstein, 1999), but follow up analyses can elaborate on this, or reanalyse the data starting from a different position or intention. By adding a latent content analysis, the interpretation of the initial transcript data (Holsti, 1969), to this initial manifest content analysis I can execute a summative content analysis (Hsieh & Shannon, 2005). This allows me to imbue the initial quantification of my transcript content with more contextual and subtextual consideration to further extract meaning from the participants' responses. A search for words, relevant to the three chosen quantitative values, was undertaken. This counted not just their presence but also their frequency, participant attribution, and the context in which they were spoken. By drawing comparisons between these different qualities of the words in the participants' interview responses I have the advantage of unobtrusively ascertaining insights into my participant's thoughts about the automated researcher.

Table 8.3. shows the results of my summative content analysis. Each row shows the presence, frequency, and participant attribution of the analysis for each of the word/phrase groups being examined in the question responses.

	Presence	Frequency	Participant Attribution
Positive	16	31	1-4, 6-14, 16, 18, 22
Negative	8	22	4, 5, 12-15, 17, 18
Neutral	11	18	1, 4-8, 12, 14, 15, 17, 18, 21
Mixed	8	10	2, 4, 11, 13, 14, 19-21
You/He	11	23	1, 3, 4, 6, 9, 10, 13, 14, 17-19
It	8	11	2, 3, 8, 11, 14, 15, 17, 22
Real Researcher	6	10	2, 5, 6, 17, 18, 21

Table 8.3.) Table displaying the results of the summative content analysis.

The context of each word/phrase group is thus:
Positive - Most answers that contained a positive response were less likely to also contain negative responses, as opposed to a response consisting of a mixture of positive and negative comments. Also, responses where positive language was present, but negative language was not, tended to contain a higher frequency of positive comments than responses with a mixture of positive and negative comments present. Also, if a response contained a mixture of positive, negative, neutral, and mixed comments, then the positive comments were more likely to be introduced later on in the answers, as if to provide a balance for earlier negative or mixed comments in the response.

Negative - Similar to Positive word group results, half of responses that could be described as negative contained little to no positive responses in balance or opposition. Similar to Positive word group results again, if a response was mainly negative, then a higher frequency of negative words or phrases were used compared to generally mixed responses.

Neutral - Neutral responses were either words with relatively low content, such as “fine”, or words and phrases that related to other automated everyday systems, such as automated help desks. If a response contained a higher frequency of neutral language it was more likely to contain negative comments or a general mixture of positive and negative comments, compared to the more positive responses.

Mixed - Mixed responses tended to reference words or phrases like “strange”, “weird” “Uncanny Valley” or “odd”. If they were present in a response at all, they were more likely to appear early on in a response and to only be used once. They were more commonly present in short responses, and if used in longer responses they were used more frequently or initially.

You/He - Although I counted references to the pronouns “you” and “he”, the use of the phrase “you” to refer to the automated assistant was by far the most frequent, with most people that treated the experience as a real person directing their answers to the automated researcher rather than the real researcher or a future researcher viewing a recording of the response to the question. The responses with the most frequent uses of this language didn’t tend to balance it out with language concerning the automated researcher as an “it”, and tended to be responses that used a majority of one type of positive/negative/neutral/mixed language, and to a high frequency.

It - This sort of language was spread quite widely across different types and lengths of response, and didn’t appear to be used in any particular position or at a variety of frequencies depending on other characteristics of the responses. It appears to be inert and its presence or frequency doesn’t seem to be dependent on other language in the responses. It is less likely to be present multiple times if multiple instances of “you” or “he” are used, and it is more likely to be frequent in responses that have a high frequency of multiple categories of words.

Real Researcher - These responses are not a particularly frequent occurrence but, when present, tend to be present in mixed or negatively skewed responses.

Table 8.3., and the above contextual descriptions, shows that participants used positive language about the automated researcher interaction experience (“really easy [to interact with]; it’s been great; like you were here with me”[P9]) they tended to do so with a high frequency, as the only language in a short answer, or to balance out a previously negative or mixed comment. If participants used a large variety of language in the responses, they tended to be either more negative or neutral overall (“Like like, yeah, I don't know what it is, but it’s, it's because it's so close to being a real person, and it's not”[P15]), or mixed responses with more mixed language occurring early on in the response (“strange… so automated… annoying…quite frictionless… actually quite nice”[P4]). Participants would also refer to the experience as if it were a human

researcher more if they enjoyed the experience of interacting with the automated researcher (“Fine, you’re lovely!”[P1]), and if they did not enjoy the interaction experience they would be more likely to bring up the human researcher as a comparison to the automated researcher (“a little strange, knowing that you’re there but that’s not you”[P2]). However, this analysis focuses primarily on patterns within the responses from individual participants. The wide participant attribution for all of these groups of language is worth further, deeper investigation to identify broader patterns between the participant responses.

8.2.3. Frequency Quantitative Analysis

Further quantitative analysis then took place to investigate the significance of these observed relationships from the Summative Content Analysis. The frequency of the above seven observed types of response were noted for each individual participant and compared to look for significant trends in the frequency.

A Shapiro-Wilk test was conducted for each of these response groups, all of which showed a significant departure from normality (Positive $W(22) = 0.843$, $p = 0.003$; Negative $W(22) = 0.585$, $p < 0.001$; Neutral $W(22) = 0.763$, $p < 0.001$; Mixed $W(22) = 0.630$, $p < 0.001$; You/He $W(22) = 0.759$, $p < 0.001$; It $W(22) = 0.681$, $p < 0.001$; Real Researcher $W(22) = 0.586$, $p < 0.001$). Due to this, these values were compared using a Friedman Test to look for statistically significant differences between their frequencies. The Friedman Test showed that there was a statistically significant difference in the frequencies of the types of language used to describes the automated researcher, $\chi^2(6) = 17.208$, $p = 0.009$. Post hoc analysis with Wilcoxon signed-rank tests were conducted.

Context 1	Context 1 Mean Rank	Context 2	Context 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
Positive	13.50	Negative	7.35	Z = -1.447, p = 0.148
Positive	9.40	Neutral	9.54	Z = -1.718, p = 0.086
Positive	7.17	Mixed	8.81	**Z = -2.442, p = 0.015**
Positive	8.50	You/He	7.82	Z = -1.511, p = 0.131
Positive	8.00	It	9.21	**Z = -2.552, p = 0.011**
Positive	9.00	Real Researcher	10.27	**Z = -2.436, p = 0.015**
Negative	6.00	Neutral	8.17	Z = -0.263, p = 0.793
Negative	3.60	Mixed	7.40	Z = -0.977, p = 0.328
Negative	5.67	You/He	10.00	Z = -0.389, p = 0.697
Negative	4.92	It	8.79	Z = -1.141, p = 0.254
Negative	4.17	Real Researcher	5.42	Z = -1.207, p = 0.227
Neutral	8.60	Mixed	8.45	Z = -1.379, p = 0.168

Context 1	Context 1 Mean Rank	Context 2	Context 2 Mean Rank	Wilcoxon Signed-Ranks Test Results
Neutral	8.25	You/He	5.93	Z = -0.287, p = 0.774
Neutral	7.75	It	7.40	Z = -1.431, p = 0.152
Neutral	5.33	Real Researcher	6.25	Z = -1.554, p = 0.120
Mixed	8.30	You/He	5.50	**Z = -1.998, p = 0.046**
Mixed	6.29	It	6.80	Z = 0.420, p = 0.675
Mixed	7.00	Real Researcher	5.17	Z = -0.183, p = 0.855
You/He	5.5.	It	7.94	Z = -1.292, p = 0.196
You/He	6.33	Real Researcher	6.56	Z = -1.594, p = 0.111
It	6.50	Real Researcher	4.83	Z = -0.159, p = 0.873

*Table 8.4.) Results of the Wilcoxon Signed-Ranks tests conducted on combinations of the contexts from the summative content analysis. Significant results are presented in **bold**.*

These results show significant differences between the frequency of use of positive descriptive language and language that referenced the believability of the automated research assistant (mixed language, referring about it but not to it, and referencing the real researcher). This also shows significant differences between the use of mixed language and that which indicates talking to the automated researcher as if it were real. This is strong evidence that when participants liked the experience it was because they considered it to be in some way equivalent to themselves in terms of reality, i.e. they liked the experience of talking to something that simulated a real conversation. Likewise, mixed feelings about the experience were significantly less likely to be present when referring to the automated researcher as if they were real. This means that there is evidence in both directions that the Enjoyment of interacting with the automated researcher can be explained by way of how similar to an ordinary conversational experience the participant found it. However, there is more information within the transcripts that I haven't yet analysed, so a further in depth qualitative analysis was executed to do this.

8.2.4. Conventional Content Analysis

It's worth executing another type of Qualitative Content Analysis in order to more broadly interpret meaning from the transcripts of the participants' responses to the interview question concerning the automated researcher. A conventional content analysis was undertaken (Hsieh & Shannon, 2005) as the existing theory and research on automated free motion video research assistants, is limited and this method does not rely on any pre-existing foundational theory or research. This type of analysis is also possible because the interview question asked by Auto-Joe, "How did you find talking to me today?", was designed to be open-ended and this generated answers with a variety of length and detail, from the monosyllabic to the essay-like. The steps I took for this analysis are as follows:

1. The transcripts of the answers were read in their entirety once through, before being read in more detail to derive codes; the key words extracted from the text that hold the most information about the thoughts or opinions of the interviewee.

2. I then made notes about this first pass of the interview answers in case this became useful when analysing codes at a later stage; my initial impressions, thoughts, and a surface analysis of the content of the responses.

3. The next step is to label the codes to decipher if any particular word choices reflect multiple meanings, with these codes then being sorted into categories based on their inter-code relationships.

4. The categories are then used to group codes into multiple clusters, with clusters combining or separating depending on the strengths and weaknesses of the inter-code relationships within and between them.

5. This final assortment of codes is then arranged into a hierarchical structure and this structure examined to look for comparisons with other structures or models with relevance to the interactive narrative, data-driven art, or automated UX fields.

Taking the first reading as that from the summative content analysis, the transcripts were read in more detail and key words were identified and set aside. These codes were then labelled to decipher if word choice in the participants' responses reflected multiple meanings, with codes eventually grouped into the categories detailed further in Table 8.5. Some codes inhabited multiple categories.

Category	Code Example
Positive descriptive language	"you're lovely" [P1]
Negative descriptive language	"the worst experience ever" [P15]
Neutral descriptive language	"fine" [P21]
Language directed at the automated researcher	"you're very good at the reading of the laptop" [P14]
Language directed away from, but about, the automated researcher	"talking to a video" [P8]
References to the human researcher	"I already know who you are" [P18]
References to strangeness	"It's a little bit odd" [P13]
References to amusement	"that's actually quite funny" [P19]
Surprise of the experience's efficacy	"quite frictionless… which is actually quite nice" [P4]
References to the automated researcher's behaviour	"he pushed past that" [P4]
References to other automated systems	"a little bit like a Helpdesk" [P7]

Category	Code Example
References to the uncanny valley	“uncanny valley, kind of feeling the heebie jeebies” [P17]

Table 8.5.) Categories used to group codes as part of a conventional content analysis, with examples of codes for each category.

It is also important to note the gaps in this pattern of codes at this stage. While references to other real-world systems were present in the responses of some participants, no references to fictional automated systems or AI were made when responding to this question. Also, while responses were made saying how surprisingly easy some participants found interacting with the automated researcher, none were made concerning the opposite scenarios, namely being surprised at how difficult the system was to interact with or how the system being difficult to interact with met their expectations.

I then took these categories and grouped the codes within them together into as few clusters as possible. I combined codes concerning positive, negative, and neutral language into one cluster, which I called Enjoyment. I combined strangeness, the uncanny valley, amusement, surprise of the experience’s efficacy, and references to other automated systems into a second cluster, which I called Expectation. My third and final cluster consists of codes concerning whether the language was directed at the automated researcher, away from them but about them, references to the human researcher, and references to the automated researcher’s behaviour, which I called Believability.

Arranging these three clusters in a hierarchy can be done in a number of ways, but I'll use the prevalence, the presence and frequency, of the language that makes up their codes to identify which codes are the most prevalent and use that as a measure of importance for the purposes of the hierarchy. Figure 8.5. shows the result of this hierarchy construction, as well as the above clustering of codes. Using this method it’s clear that the Enjoyment cluster is the most important, as the codes were present in every response and were often present multiple times per response. Following this is the Believability cluster, with its codes having lower presence and frequency than the Enjoyment cluster but still a large prevalence. Third is the Expectation cluster with the lowest prevalence of its codes in the participant’s responses.

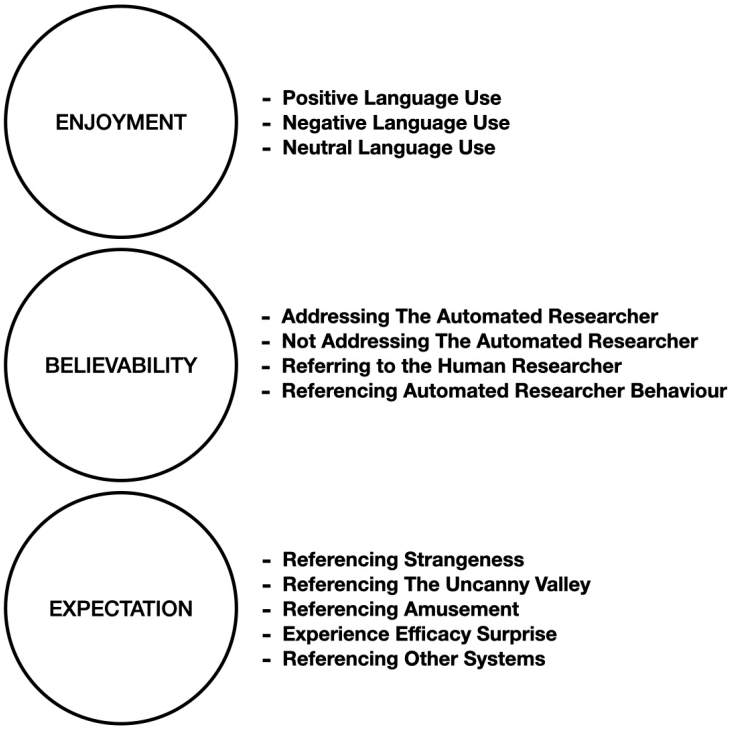

Figure 8.5.) Diagram showing the results of steps 4 (clusters) and 5 (hierarchy) of the conventional content analysis.

When examining this structure it's clear that my decision to focus on measuring participant Enjoyment in other parts of this thesis was correct as this is the most important cluster in my hierarchy, meaning that this is the most often discussed topic by my participants when prompted with an open question about a behaviour driven content delivery system, in this case the automated researcher. While Enjoyment of *GUEST* and Enjoyment of the research process are different flavours of Enjoyment, these parts of the research process look the same, are interacted with in the same way, run off the same system, and both aim to simulate real-life social interaction, so I'm happy to draw this broader conclusion from these results.

Believability being the second cluster is interesting as the question's phrasing doesn't prompt participants to discuss any particular aspects of believability or realism, so participants must be bringing this up themselves. Also, the analysis of my quantitative frequency data showed a clear relationship between positive language and several traits in the participants' responses that could all also fall within this Believability cluster, further bolstering its presence and position in the hierarchy.

Expectation being a cluster is also not surprising, as the experience is unlikely to have been experienced by the participants before, so talking about what they imagined it would be like going into it makes sense when reflecting on the assistant. However, interesting to note, that the questions asked to generate these responses were open ended and did not ask participants to specifically talk about their preconceptions or expectations.

Similarities between this analytical structure and others in the fields of interactive media aren't immediately apparent, but that isn't particularly surprising as a lot of research around these experiences doesn't necessarily focus on thoroughly measuring audience Enjoyment, which my hierarchy suggests is the most

important element to consider when analysing participant feedback about the automated researcher. Likewise, the Expectation cluster doesn't seem to align with any particular systems or structures in these fields, in spite of this not only being a cluster populated with the largest quantity of types of code labels, but also audience expectation being such an important tools in the storyteller's arsenal for shaping dramatic and engaging narratives. Perhaps a lot has been overlooked when it comes to the ways in which these sorts of experiences are created, tested, and researched if elements such as Enjoyment and Expectation don't have a wide spread system of measure or detection from the audience (such as Roth, 2015), even though they are some of the features of an experience that, when given free reign to talk about any aspect, audiences choose to talk about often and in detail.

However, the Believability cluster being of second importance does make sense, as this concept of believability could be seen to link into the ideas surrounding Liveness, previously discussed in Section 3.2. The language codes that make up this cluster all focus on how believable the automated research assistant was compared to a real human researcher, and in that sense this cluster details the similarities or disparities between a real and simulated experience, very much in the same vein as questions of Liveness, especially questions concerning Presence, Immersion, and Embodiment. Using this similarity I can look at whether systems that include measures of Liveness might mirror the structure that my Conventional Content Analysis has derived from my participant responses. Going back to the Liveness Wedge, reproduced in Figure 8.6., I can align the Believability cluster along the Liveness axis. This leaves me with two previous wedge axes (audience ability and willingness) and two clusters (Enjoyment and Expectation) with a surprising amount of overlap. Though they don't overlap directly, it's clear that there is a relationship between audience ability and willingness to engage with Liveness and the Enjoyment and Expectation that audiences feel and have concerning a live experience.

For an experience with strong Presence, willingness doesn't factor into the perception of Presence as it is achieved without the consent of the audience, the only important factor is the audience's ability to perceive Presence. Enjoyment doesn't factor into this either for the same reasons; Presence is an automatic feeling and doesn't fluctuate depending on whether you like the feeling of the Presence or not. However, Expectation might correlate with the perception of Presence. If Presence is a quality of an experience that tricks your perception into believing that it is both equivalent to you in terms of existence and necessary for you to attend to, then Expectation comes into play too. Let's take an incredibly prevalent feature of some modern experiences, particularly in the horror genre of any medium, the jump scare. A jump scare works because it causes a sudden change in your perceivable environment that your perception can't help but react to, in other words, it instinctively and reflexively convinces you of its Presence regardless of the perceptual system it is perceived through (vision, listening, touch, etc) or how much and what quality of Liveness its presentation evokes (even a jump scare on a TV screen can activate this response as much as an in-person jump scare). However, jump scares are less effective when they are expected as the feeling of Presence they suddenly evoke is dampened by their Expectation. In other words, jump scares work because they are surprising and, if the surprise is expected, it is no longer as much of a surprise. This shows that there must be a relationship between the ability to experience Liveness and the Expectation of all or part of the live experience. However this quality doesn't necessarily transfer between experiences, with a jump scare in one experience not

stopping a jump scare in another experience from being able to create a sudden and overwhelming sense of Presence.

You could attempt to make the argument that you could become familiar with the trappings of a genre that uses a lot of jump scares, such as horror films, so much so that you can anticipate and not be as affected by a jump scare, but this is just learning the warning signs and, if these are removed, the jump scare is still as effective. There is a lot of literature and prior research showing the importance of environmental factors when it comes to physiological and unconscious expectations of interactions with the human body and the presence of objects in its surrounding environment. Pavlov (1927) showed that animals could be conditioned to physiologically and unconsciously react to a stimulus as if it were another stimulus simply by being used to both stimuli being presented together frequently, e.g. the dogs start salivating at the ringing of a dinner bell due to the frequent association of the ringing of that bell and the presence of food in their immediate environment. I know that Pavlovian conditioning not only happens in human brains too, but that it is responsible for some very significant systems in the brain that govern how I automatically anticipate and prepare for interacting with the world around us, with a lot of research looking at how this way of learning links to tolerance, specifically amongst heroin addicts (Siegel, 2001). Siegel (1976) shows that rats, much like humans, can become tolerant to higher and higher doses of heroin, to the point where they can survive doses that would cause an overdose in a rat that had not experienced heroin before. These studies also showed that tolerance is linked to environment, so much so that rats moved to another environment and given a previously tolerable dose of heroin would suffer from a fatal overdose. This was hypothesised to be due to an automatic and unconscious system which anticipated the heroin in a particular environment and readied the rat's body for it, which would then not activate in the novel environment conditions. More recent and very thorough evidence (Gerevich et al, 2005) shows that this automatic expectation system also governs many instances of heroin overdose in human addicts. Also, Siegel (1983) summarises how similar the tolerance mechanisms are to the generic learning mechanisms in the human brain in terms of neurological and chemical processes, giving me a huge amount of evidence to show an automatic neurological link between expectation, detection, and response magnitude in any learned process, conscious or unconscious. Simply put, by altering the Expectation of the experience, the experience's ability to evoke a neurological effect, Presence in this instance, increases. This means that there is a clear relationship between the expectation of Presence and the ability to experience it, giving more credence to the idea that my results from the automated researcher study overlap with the Liveness wedge in Figure 8.6.

The final step is showing that there is a relationship between my Enjoyment and Expectation clusters and the willingness to perceive Liveness in an experience. This makes intuitive sense, as Immersion, the extreme opposite to Presence on my Liveness axis, is a quality of an experience that can only be achieved by the audience actively participating and immersing themselves. It makes sense that if you've immersed yourself before and enjoyed it you'd be more likely to do it again, if you immersed yourself before and didn't enjoy it you'd be less likely to. Similarly, if you hadn't immersed yourself before and thought you only liked that which you had previously experienced you'd be less likely to immerse yourself and if you enjoyed trying new things you'd be more likely to. However, there is also psychology to back all this up. Much like I used examples of classical conditioning, such as Pavlov's dog, to discuss audiences responses to presence, the

audience relationship with an immersive experience more closely resembles examples of operant conditioning, such as the work of B. F. Skinner. Based on Thorndike's Law of Effect (summarised by Catania, 1999), stating that a pleasant or negative consequence would increase or decrease the chance of a behaviour being repeated respectively, Skinner (1948) studied operant conditioning using his famous Skinner Boxes. This research cemented operant conditioning as an additional way of animals learning about and interacting with their environments that included some active understanding of the ways in which their behaviour affected the world around them and how that made them feel. If a behaviour (a pigeon pecking on a button) elicited a positive environmental response (a food pellet) then it was reinforced, and if it elicited a negative response (an electric shock) then the punishment decreased the likelihood of that behaviour in the future. These ideas of positive and negative reinforcement carry over into human models, with Skinner himself (1961) showing that his teaching machine could use the ideas of operant conditioning to help encourage students to more actively participate in learning and their school work. This has been shown to be the case in other studies, including more recent research, too, such as Fryer (2011) showing that a small financial incentive to read and write a report on a book led to an increase in reading comprehension ability amongst school children. Much like in these examples, enjoying an experience will act as a reinforcer for the behaviour of reengaging with similar experiences in the future. Likewise, not enjoying an experience will act as a punisher that will decrease repeat experience engagement. Taking this into account, and including that an idea of previous Enjoyment about an experience can't be achieved without prior experience of that experience and actively reflecting on that experience and if you want to repeat it, an operant conditioning approach to an audience's willingness to immerse themselves into immersive experiences has to rely on both Enjoyment and Expectation.

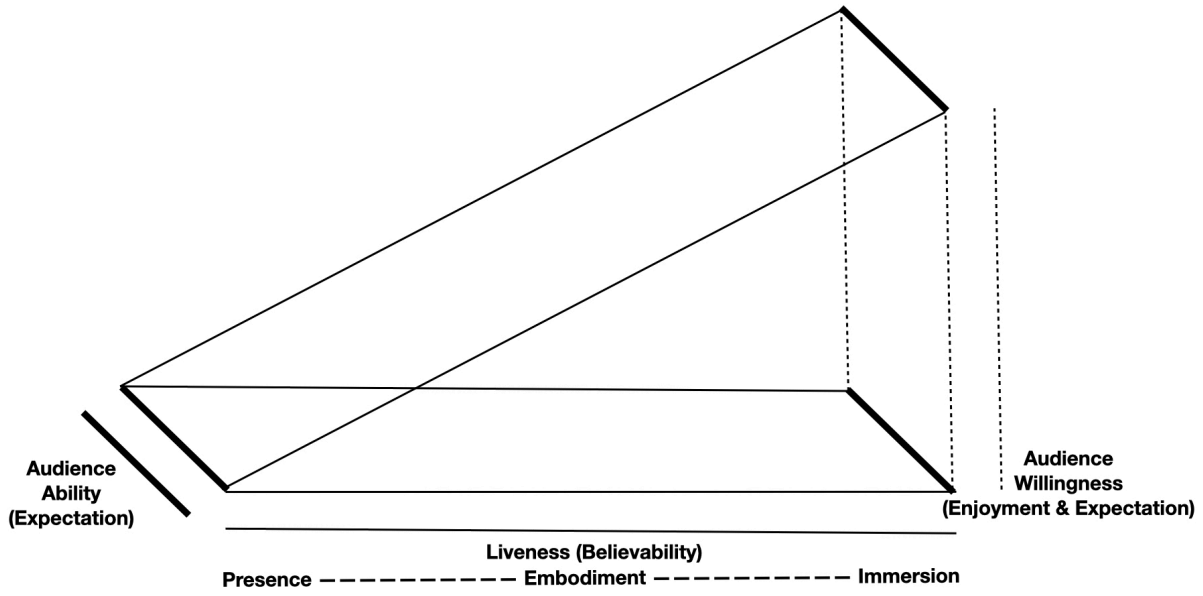

Figure 8.6.) The Liveness Wedge, a visual representation of the space within which experiences can exist in relation to their audiences. Updated from Section 3.2. with the results from Section 8.2.

To summarise, participants tended to respond positively about the automated research assistant. If they responded positively it seemed to be because they found the interaction with them believable, often in spite of their expectations when it comes to automated systems. If they didn't enjoy the interaction it was more often than not because they found it strange or not completely life like, and therefore off-putting, or because they had a higher Expectation of what the ideal version of the system should be. I also found that the three clusters generated from the Conventional Content Analysis of the participant responses to the automated researcher either align or have strong relationships with the three axes in the previously proposed Liveness Wedge; with Enjoyment linking to the Willingness axis, Believability linking to the Liveness axis, and Expectation linking to both the Willingness and Ability axes.

8.3. Summary and Recommendations

It is not only encouraging to find that, in general, people responded positively to the automated researcher, but also to have been able to show specific reasons for why this positive experience was felt by my participants. That my system was found to be believable, that is to say that it simulated a realistic enough human interaction that people innately considered the conversational agent to be human rather than automated, is particularly encouraging as this is something that a lot of people aim to achieve for their conversational agents and I have managed to show occurred in my research in spite of my relatively uncomplicated system architecture. The key to this believability is in the creative approach I've taken to designing and building this system, by embodying principles such as working smart and not working hard (see Section 6.1.), and fully utilising a practice based approach to my research design, I've managed to achieve something that other more complicated or thorough systems can struggle with; the creation of something recognisably human. Obviously a big part of that is that, visually at least, my system is human. The recordings of a performer seem less likely to trigger the uncanny valley feeling that near human, computer-generated characters seem to evoke in some participants, although this was not completely overcome by my automated researcher in every instance. However, the main take away from these findings should be that perception of whether something is humanlike or not is just that; perception. Being perception, it happens in the brain of the user, a brain which is often ignorant of the inner workings of whichever system it is interacting with. Therefore an intricate and complicated automated system might not evoke the most humanlike feeling in the mind of the user when compared to something that looks, sounds, and acts like a human being while being fairly ignorant as a conversational partner and simple in its system construction. Much like with other forms of Presence mentioned when discussing Liveness in Section 3.2., the brain's ability to perceive human presence is imperfect, like every mental process, and can be manipulated into over activity with the right perceptual and environmental cues. Therefore, there should be creative ways to trigger this feeling without making an incredibly complicated automated system, which I have shown to be the case for most of my participants.

It's clear that this automated researcher has a use for this sort of research, as the general consensus amongst participants was that of positive response, specifically due to the believability of the simulated interaction. However, there were some people who did not enjoy interacting with the automated researcher, so my system should be both refined and also used carefully so that an uncanny valley reaction doesn't spoil the data

collection in a different study in some way. The use cases best suited to the automated researcher would be qualitative research that requires a large scale data collection, or remote data collection, as part of an on-demand study that can also be run automatically. The system as it currently stands is best suited to briefing and debriefing participants, guiding them to FAQs if they have further questions, delivering surveys, and delivering embodied or structured interviews, either as stand alone data collection methods or in response to survey responses to acquire further context to the answers collected from the participant. The system is particularly good at increasing some aspects of accessibility of remote or large scale research as participants responded that interacting with the system was user friendly. It can be difficult for researchers to create user friendly research experiences, and equally daunting for some participants with lower technical experience to confidently navigate through an online or automated system. It's my belief that the humanlike features of this system would make participants feel more comfortable, and also, given how unavoidable the humanlike features of the system are, which are the comforting elements, would allow researchers to more easily create user friendly remote and large scale research studies. The system's digital nature also allows for accessibility to be included more foundational into the research, for example captioning, audio description, or BSL interpretation. The automated system can also be used to save time or resources, be that research space, researcher time, or funding that would have to be spent on an experience operator. Also, having participants engage in more research remotely makes research more sustainable as there are fewer journeys being made by participants to and from places of research. This might seem like a small benefit, but recent research has shown that in the theatre industry a large proportion of the carbon emissions created by the staging of live experiences are caused by audiences travelling to the venue, as high as 98% in some cases (Creation Theatre, 2020). There's no reason that this doesn't translate across to research projects that ask large numbers of participants to travel to a particular research space to take part and should be a consideration of using this system in the future alongside all those previously mentioned.

However, the system could still be improved further. Firstly, the switching between different filmed scenes could be jumpy in feel in the current system and a smoother transition between these moments would be of benefit to the illusion of reality the system aims to offer. Also, further performed behaviours could be introduced to help make the interface even more user friendly. While my system already utilises many of the responsiveness features labelled by van Pinxteren et al (2020) as being useful for conversational agents to have, such as etiquette, listening behaviours, and empathic facial expressions, they suggest that other behaviours to improve the user experience of conversational agents could be included, such as laughter, cooperative gestures, and a focus on realistic or situationally appropriate response times. Although some of these elements were used in the research experience itself (see Sections 5.2.2. and 5.4.5.), they weren't implemented for the automated researcher between trials, and perhaps their inclusion could create an even friendlier or more recognisably human, and therefore more comfortable, experience for participants or users.

There are still ways that the automated researcher could be further developed. One would be fully automating the researcher so that no human operator is required, something that I believe to be fully possible with the features and operations used in this research study, and the automation adjustments mentioned throughout Section 8.1. Another potential addition to the system would to include the execution of the post-research admin into the system for it to be automated during the data collection processes, such as parsing

the video or audio recordings of the participants or automatically transcribing their responses. The added benefit of auto transcription would be that further responsiveness of the automated researcher could be built to live react to the transcription as it is spoken. For example, if I repeat this research, with this additional automatic feature, I could have the system look out for instances of words synonymous with the often used terms “weird”, “strange”, or “odd” and, if detected in an answer, a follow up question asking for the context of their use could be asked to the participants. This would allow the automated system to be one step closer to running a fully fledged semi-structured interview that responds with elaboration questions depending on the content of the participants’ answers. This would further improve the flexibility and complexity of the use cases for the system, allowing it to further approach the full automation of qualitative research execution, with all the scalability, accessibility, affordability, sustainability, and user friendliness that could entail.

However, there are unhelpful uses of auto-transcription in this context, namely the over reliance on its convenience at the sacrifice of data richness. One of the best features of this research was the combination of qualitative and quantitative data collection of many different types, including the context of the words used, derived from non-transcribable communication data, such as body language, tone of voice, or speed of response. This data is full of contextual information that could be incredibly valuable for other user experience research, and would all be lost if automatic transcription was used to solely compress the spoken results from the bandwidth and storage heavy video format into simpler and smaller text files. Also, auto transcription moves away from the philosophy of the practice based work that the automated system is built upon; the idea of working smart, not working hard. Most interactions, in most situations, can be navigated by an automatic system without having to have a perfect grasp of what the participant is saying as a lot of research situations have limited behaviours that a participant could be reasonably expected to enact. Even if they did react out of the ordinary in some unpredictable way, you wouldn’t have a recording of the performer playing the researcher to navigate the participant in response to their behaviour, meaning that even if you detected it you might not be able to respond to it in a way that felt meaningful. This trail of thought can cascade into the creation of a needlessly complicated system in order to overcome potential issues that are actually unlikely to arise if the system is built simply but intelligently and carefully in the first place.

To convince you further of this, consider the following analogy. If you’re a magician and you perform a magic trick where you ask the audience to name a playing card, they say “Queen of Hearts” and you pull the very same card out of your shirt pocket, that is impressive. It is still impressive even if you have a version of several cards hidden somewhere else on your body; an Ace of Spades in your wallet, a Joker in your shoe, a hidden Three of Clubs tattoo on your forearm, because your audience isn’t aware of this. It’s even still impressive if, after them naming a card you don’t have secreted somewhere, you ask them to find that card in the deck and proceed to perform a different trick. It only loses its impressiveness if you reveal the different potential paths in front of the audience, the different potential outcomes, before they name their card. To begin to reach for your shirt pocket, then change your trajectory once the card is named fully, diminishes how impressive the trick is. This automated researcher can be thought of as a trick, magical or otherwise, and the revelation of its true nature weakens the user’s opinion of it. This is why one should be careful of trying to add too many extra features to the system, as the more complicated it becomes the more likely that a misfire in its execution reduces the participant’s confidence or faith in the system as a whole, with potentially

disastrous results depending on the research being conducted. The system is lightweight on purpose and it is this researcher's belief that that is where its power and usefulness lie.

In fact, depending on your desired use case, this lightweight quality is the main benefit and weakness of the system. The automated researcher is designed to simulate or impersonate a human interaction, not replace or replicate it. It is not suited for every use case but, when it is suited, it works well and results in an enjoyable user experience in most cases as my results show. The system being lightweight allows for easy scalability and remote data collection, with all the benefits listed above, and does allow for some adaptation to specific researcher or study needs. Plus, it being lightweight does mean that there is some slack for more complex additions to be made to the system if required. However, just because the implementation of the system is lightweight doesn't mean the creation is. A new system is necessary for each study, with new scripts and recordings for each scene of the automated researcher's navigable path, as well as new combinations of scenes, interactions, logic of how scenes connect etc. Each research study requires a new system to be built, but within the philosophy and guidelines of this initial system. However, this extra creative effort allows for a lower technological effort, both up front and during implementation, making the system more user friendly and infinitely adaptable to any research study or situation. With this system the limits are only put in place by your imagination, with its power residing in its simplicity, so future uses of the system should feel free to adapt and expand it to any use cases that requires a human fronted guide through a remote research process with the sort of scalability and accessibility that only automation can reasonably provide.

It is also clear that the automated researcher, similar to the research experience itself, exists within the complicated milieu between Narrative and Interactivity, alongside other aspects of the experience, including its presentation, the amount it's replayed, the expectation of the user, their preconceptions about automated experiences, and whether they detect Liveness or Presence from the system. Given the intertwining nature of these features, a broad discussion of all three research chapters will take place in order to draw conclusions which can be turned into development guidelines for these interactive digital narratives in the future.

9. Discussion

The results from these three studies paint the picture of Narrative and Interactivity (Chapter 6.), Audience Behaviour (Chapter 7.), and automated researchers (Chapter 8.), as well as digital Liveness (Sections 3.2. and 8.2.4.), as existing within a complex web of relationships with both different subcategories of Enjoyment and other categories of codes that have been identified as a result of these studies and their subsequent analyses. This discussion will revisit the results from each of the three studies, contextualise them in regards to the other studies' results, and draw some broader, over-arching conclusions about the underlying relationships between Narrative, Interactivity, Audience Behaviour data, and Liveness. I'll then suggest some directions for both future research and creative practice, and reflect on the limitations of the exploratory nature of the performance-led research design that I undertook and how the results of my research can be explored further and in more detail in the future by artists and academics alike.

9.1. Making An Enjoyable Interactive Storytelling System

Having identified in the literature review that researchers can consider Narrative and Interactivity as opposing forces, with the presence of one mis-correlated as leading to the absence of the other, my first research question was to examine in what ways Narrative and Interactivity influence Enjoyment. This was because, rather than the prevalent belief that these qualities of an interactive experience oppose each other, both of these qualities can easily be present in the same experience if other creative decisions are made to allow for it. It is an argument of this thesis that both qualities should be present in an experience where possible, if both can be shown to improve the Enjoyment of that experience amongst audiences. It was my hypothesis that there will be a significant difference in Enjoyment scores between the different Narrative and Interactivity conditions, showing that these qualities both provide valuable forms of Enjoyment for audiences during the Interactive Storytelling experience. This is what I found for Interactivity, with the Quantic and Random Interactivity conditions providing significantly more Enjoyment than the Catherine condition. Whether they provide different forms of Enjoyment or not was also explored with this research, with my results showing the Enjoyment subcategories of Presence, Character Believability, and Curiosity being responsible for this significant difference. Further qualitative analysis of interview responses concerning these Enjoyment subcategories revealed three main causes for this Enjoyment; the similarity of the interaction to a real-life interaction (Interaction Similarity), the similarity of the character to a real-life conversational agent (Agent Similarity), and the way in which the participant was able to control the conversation (Conversational Control).

9.1.1. Combining Interactivity and Narrative

Our Narrative results showed no initial significances in my broad analysis, but revealed more significant relationships in my more specific follow up analyses. The Enjoyment felt during the initial stages of the experience was significantly mediated by the subcategory of System Usability. Variations in individual narrative steps also caused significant changes in the Enjoyment scores of various subcategories. Differences

in Presence were found to be significant here, much like they were with the Interactivity analysis. Differences in Curiosity were also found to be significant, however the differences were more significant between Narrative conditions when compared to their significance in the Interactivity analysis. Unique significant differences in Enjoyment subcategory scores for the Narrative analysis include Optimal Task Engagement and System Usability, as well as Aesthetic Pleasantness & Eudaimonic Appreciation, Satisfaction of User Expectations, and Autonomy. Further qualitative analysis of interview responses concerning these Enjoyment subcategories revealed six main causes for this Enjoyment.

Three of these causes were shared with Interactivity analysis; similarity to a real-life setting, similarity to a real-life conversation partner, and similarity to the open ended and malleable nature of real conversation. An additional three Enjoyment causes were unique to Narrative; smoothness of the user experience, preconceptions about the experience, and the effect of repetitions of the experience. UX Smoothness was associated with the significant differences in Optimal Task Engagement and System Usability. Experience Preconceptions and Experience Repetitions were more closely associated with Aesthetic Pleasantness & Eudaimonic Appreciation, Satisfaction of User Expectations, and Autonomy, where positive and negative influences could be felt within the elaborations on these Enjoyment subcategories.

Given that my first research question examines Interactivity in a broad sense of the word, I wanted to focus my research to look at different methods of Interactivity to see if variations in Enjoyment could be observed. Also, successful meaningful Interactivity and Liveness comes down to communication between the real world and the digital story being presented within it as if belonging there. This is similar to the traditional visual form of AR, except where in that form the graphics have to register to the user as being a part of the environment they are laid over, but in this experience it is the story has to fit into the audience's environment in a convincing way. This illusion is most convincing when effective communication is being utilised and, in order to do that, the experience needs to receive and process Audience Behaviour data and respond in a smooth and sensible way just as a real-life version of the experience would allow for. In order to ascertain this, I split the experience up into its different Audience Behaviour modalities in an attempt to understand in which ways the use of Audience Behaviour data made my story enjoyable. It was my hypothesis that there would not be any significant differences between the Enjoyment scores of the Audience Behaviour modalities. Overall, this is what I found, with there being no significant differences between the Enjoyment scores for the broader Speech Presence condition, nor for the Overt Attention condition. However, when breaking the analysis down further, every individual Audience Behaviour modality had significant differences in their Enjoyment scores other than Gaze Absence. Further qualitative analysis was undertaken to examine these significances in more detail to look for trends in the accompanying interview responses for each Audience Behaviour condition. This analysis revealed a variety of different information to us. Some Audience Behaviour modalities were influenced significantly by Enjoyment causes, like how Gaze Presence was shown to be influenced by how the participant behaved during the experience (Own Behaviour), the way the system controlled the experience (System Control), and the participant's consideration of the internal mechanism of the system driving the experience (System Mechanics). Some modalities were influenced significantly by Enjoyment subcategories, such as Speech Presence and Speech Absence which, while touching upon a variety of Enjoyment causes, were unanimously discussed during elaborations on the

Enjoyment subcategory of Engagement. Other results looked significant initially, such as the modalities of Prolonged Speech Presence varying significantly on account of System Control, Limited Speech Presence varying on account of the quality of the interactions between participant and conversational agent (Interaction Quality), and both these modalities varying on account of the feeling of realism the system generated (System Realism). However, further investigation revealed that these significant differences could actually be a result of the previously identified significant difference in the scores between the Quantic and Catherine Interactivity methods. Overall, audience Enjoyment was mediated by five main causes as discussed above; Own Behaviour, System Control, System Mechanics, Interaction Quality, and System Realism.

Comparing the Enjoyment subcategory findings of these studies reveals some interesting shared results. The analyses from both studies share references to instances of significance for the Enjoyment subcategories of Presence, Optimal Task Engagement, Autonomy, and System Usability. This might be due to how important these elements of Enjoyment are to an Interactive Storytelling experience that seeks to create the feeling of a real-world interaction or conversation. There are certain Enjoyment subcategories that are more important than others when it comes to various qualities of an Interactive Storytelling experience. For example, the subcategory of Suspense might be important in a horror or thriller experience, but isn't necessarily fundamental for the telling of a good story in every genre. In contrast, if your story aims to create a rich tapestry of visual storytelling that immerses the audience into a vibrant fantasy world then Aesthetic Pleasantness and Eudaimonic Appreciation is a subcategory of Enjoyment of paramount importance. For this experience, with its convincing simulation of a real-world conversation, it makes sense for the Enjoyment subcategories with the most significant differences between their scores to be those associated with Liveness (Presence), Engagement, Freedom (Autonomy), and Usability. If this is the reason for these significances, I might also expect to see significances in the categories of Character Believability and Effectance, given that they share similar features to the other categories given their relationships with the realism of the experience. These categories have significant relationships within each analysis, just not between them, so this meets my expectations to a certain degree. This is strong evidence within my findings for a significant part of the Enjoyment generated by the experience as coming from how realistic it felt.

There are also some differences between the results regarding Enjoyment subcategories. My first research question shows a large number of significant Enjoyment subcategories, including Aesthetic Pleasantness, Satisfaction of User Expectation, Curiosity, and Character Believability. This is not necessarily surprising as a result. Curiosity was a subcategory more significantly linked to the Narrative quality of the experience than the Interactive, so its lack of a significance in the Audience Behaviour analysis is not surprising and fits with this Narrative analysis finding. Aesthetic Pleasantness and Satisfaction of User Expectation are both complicated subcategories, with their ability to affect Enjoyment in multiple ways between the participants. Whereas other subcategories have simple, mono-directional relationships with Enjoyment (e.g. the more Present, or Engaging, or Usable it felt the more enjoyable it was) these two subcategories had a multi-directional relationship with Enjoyment, with the same level of aesthetic or expectation satisfaction or subversion being reported as eliciting wildly different levels of Enjoyment between research participants. This makes them harder to measure in the same way as the other subcategories and might minimise their

chances of inter-study significant relationships. Also, these were subcategories linked entirely to the analysis of Narrative, so their lack of related significance in the Audience Behaviour study could be expected. However, by this logic, the subcategory of Curiosity should have significances in the Audience Behaviour analysis which my results did not show to be the case. This could be down to the different analysis methods between the two studies, or how an analysis of Audience Behaviour isn't a full analysis of Interactivity, leaving some elements of that feature out which might link more with Curiosity. My results showed that Curiosity was a more significant subcategory when it came to Narrative compared to Interactivity, and within the Interactivity analysis it linked more closely with the qualitative code of Conversational Control, so maybe this is an Enjoyment subcategory that is relevant to Interactivity in the sense of the inner workings of a system that creates Interactivity, but not the input or output of that system; the user or conversational agent behaviour.

9.1.2. Using Audience Behaviour Data

Our second research question also shows many significances relating to the Enjoyment subcategories of Effectance, with other significances relating to the subcategories of Suspense and General Enjoyment observed in this analysis but not in my first study. For Suspense and General Enjoyment this could be down to how easily influenced these subcategories are by other Enjoyment subcategories. Suspense feels much more like a fragile quality that can be diminished by other negative features of an experience, and General Enjoyment can obviously be affected in this same way given that it measures an overall quality of Enjoyment. These qualities are more likely to average out in a broad analysis, like with my first study, and more likely to shine through in a specific analysis of the positive and negative significances in a sample, as is the case with my second study. They also don't appear that often, with only a few mentions in the qualitative analysis in my second study that just might not be broadly significant. However, Effectance is a subcategory that appears consistently significant throughout the qualitative analysis of the second study without any significance in the first study. This could be because of how the subcategory of Effectance links to ideas and feelings of meaningful interaction; of an ability to purposefully affect premeditated change in the interactive story. A closer look at the analysis of Audience Behaviour shows Effectance to have significance when it comes to negative responses of Gaze Presence and Speech Absence. Effectance was also specifically associated with positive responses of Prolonged and Limited Speech Presence, which each had strong links to the Quantic Interactivity method. Simply put, failures of Interactivity are associated with discussions of Effectance, as are trials of the experience that used the most enjoyable Interactivity method. This is strong evidence for the same sort of averaging out as hypothesised for the Suspense and General Enjoyment subcategories, with the positive and negative discussion of this quality interacting and potentially canceling out its detection in a broader analysis.

Comparisons between the qualitative coding for these studies share many similarities, as a lot of the same Enjoyment causes appear in each analysis, just with different labels or associations. For example, the Agent Similarity and Interaction Similarity codes that appear in both the Interactivity and Narrative analyses can be covered by the Audience Behaviour code of System Realism. The Narrative analysis code of UX Smoothness can be covered by the Audience Behaviour code of Interaction Quality, as can the code of Conversational

Control from the Interactivity and Narrative analyses. It makes sense for there to be shared codes between the Interactivity and Audience Behaviour analyses due to these being directly linked features of the experience. It also makes sense that these codes would be System Realism and Interaction Quality as these are the two most important codes generated by my analysis for any UX interaction that aims to simulate an equivalent interaction in the real world. I would expect System Realism to link to Enjoyment subcategories such as Presence and Character Believability, as these are categories that directly link to the feeling of Liveness of the conversational agent a user is interacting with, and this is exactly what I see in these results. The Audience Behaviour code of Interaction Quality links with the first study codes of Conversational Control and UX Smoothness, which are in turn linked to the Enjoyment subcategories of Curiosity, Optimal Task Engagement, and System Usability. This also makes sense given that Interaction Quality as a code can be considered as a multifaceted amalgamation of qualities of the interaction, including its ease, appropriateness, and how it might affect future interactions, all features which link to these three Enjoyment subcategories. If this were the case, I might also expect code overlaps between any significances in Presence, Character Believability, Autonomy, or Effectance, four Enjoyment subcategories which might seem to fit sensibly into this group. However, Presence and Character Believability align more closely to qualities of Liveness, which is a broader concept than the interactions themselves. This could also be said about Autonomy and Effectance, with the freedom to interact and the meaningfulness of that interaction not quite qualities of the interaction itself but instead qualities of the interaction's relationship with the system, the experience as a whole, and the user's familiarity of how the two interact. If this were the case, this would make these subcategories more likely to align with codes such as System Control or System Mechanics from the Audience Behaviour analysis of Experience Preconceptions or Repetitions from the Narrative analysis. This is what I see, with Effectance in the Audience Behaviour analysis Autonomy in the Narrative analysis.

There were also unique codes for the Narrative analysis in the first study, namely Experience Preconceptions and Experience Repetition. This all makes sense for the same reason as the previous comparison; that Audience Behaviour is not a subset quality of Narrative and so the Narrative analysis having codes that don't overlap with those from the Audience Behaviour analysis fits this idea. Similarly, the Audience Behaviour analysis had its own unique codes of System Mechanics, System Control, and Own Behaviour which did not overlap with the Narrative analysis. However, these also failed to overlap with the Interactivity analysis, which needs some further discussion to decipher. Perhaps this is due to a similar reason to the difference found in their Enjoyment subcategory significances; that some artefact of the slightly different analysis methods between the two studies allows significances to more easily appear in the Audience Behaviour analysis than in the Interactivity analysis due to the former's more specific examination of the positive and negative subcategory significances?

The combination of these results, correcting for any repeat or nesting code categories, suggests the existence of seven unique codes, the content of which significantly impacts user Enjoyment of the Interactive Storytelling experience. These are:

1. System Realism, or how close to reality the system feels
2. System Mechanics, or how the insides of the system work

3. System Control, or how a user's behaviour can influence the system
4. Interaction Quality, or how interacting with the system feels
5. Own Behaviour, or how a user interacts with the system
6. Experience Preconceptions, of what the user considers prior to the experience
7. Experience Repetitions, or what the user considers having played and replayed the experience

These results share similarities with schools of thought in the world of game design, specifically the Mechanics, Dynamics, and Aesthetics (MDA) concepts outlined by Hunicke, LeBlanc and Zubeck (2004). Mechanics, as outlined by Sharon Boiler (Learning Game Design), are the rules and procedures that guide the behaviour of both the player and game, or the user and the experience in my research. Dynamics refers to the behaviours and actions of the user that arrises from the mechanics of the experience, or how the users interact with the game or with each other in a group scenario as a result of the way the mechanics of the experience, which this quality is directly related to (Mansfield, 2021). Aesthetics refers to the literal visual, aural, or tactile design of an experience, but also to the general way that the experience makes a user feel. This quality is created directly by the dynamics, and therefore indirectly by the mechanics of the experience. Another interesting observation about these categories is that the order of perception of them flows in two directions, depending on whether it is being perceived by the designer of the experience or being experienced by the user, as represented in Figure 9.1. from Mansfield's workshop on Playable Theatre.

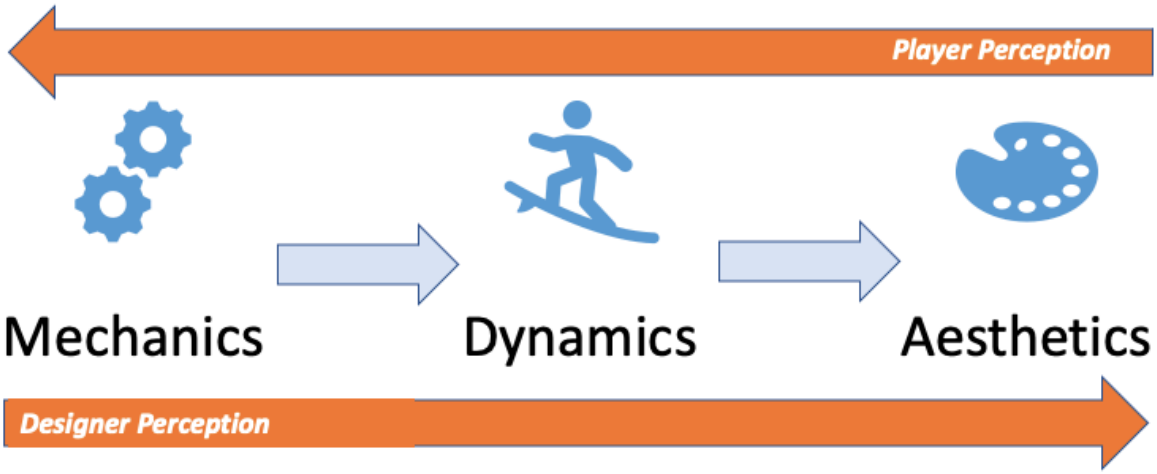

Figure 9.1.) Mansfield (2021) diagram used to explain the relationships between Mechanics, Dynamics, and Aesthetics in the design of games and interactive playable theatre. The blue arrows show the direction of creation, with the orange arrows showing the direction of perception for designers and players/users.

The MDA structure has similarities to my results for the first two studies, and can help me further understand which of these unique code categories are the most important from both a designer and user perspective. Mechanics aligns very easily with the code category of System Mechanics. Dynamics aligns with the System Control, Own Behaviour, and Experience Repetition code categories because these three categories describe the behaviour of the user, and how those interactions with the experience influence future interactions. Aesthetics align with the System Realism, Interaction Quality, and Experience Preconception because these categories describe the way the experience feels, or is anticipated to feel. A key benefit of these results is that they reflect this pre-existing structure for describing experience creation and interaction, giving credence to

my analyses in terms of validity, while also further elaborating on this simple structure in a way that allows for a broader consideration for storytellers and experience designers.

9.1.3. Running the Research Using the Storytelling System

Having constructed the research experience, the way in which the research should be conducted was decided upon. Using the principles of Performance-led research, I decided to investigate whether the responsive conversation simulation created by my system for storytelling purposes could also be used to power an automated research assistant for as many aspects of the execution of the research as possible. This included the initial briefing and calibration steps, as well as the quantitative and qualitative data collection after each relevant experimental trial. My hypothesis was that this would be entirely possible given that, other than a change in content, the system is displaying the same media, responding to the same Audience Behaviour data, and navigating through structured content pathways to deliver relevant content in a responsive way. However, there may have been some quality of the experience of interacting with an automated person that might shine through in this administrative use of the system that is absent for the storytelling use of the system. There's lots of research showing people being uncomfortable with automated systems that exist in the uncanny valley and feel almost lifelike (Mori, 2012) and while the dialogue in my experience was crafted specifically to help overcome this, but this wouldn't be as much the case for these automated researcher dialogue options as they have to serve a more experimental, and less creative, purpose.

I asked the participants what they thought of the automated researcher, in a final question after the rest of the study had been completed and they had been interacting with them, on and off, for around about an hour. These results underwent several layers of quantitative and qualitative analysis until three main categories of codes emerged; Enjoyment, Believability, and Expectation. These were the three main unique and important considerations when it came to the participants' opinions on the automated researcher, which were overall positive, enjoyable, and agreed with my hypothesis. What's interesting to note is that these three categories align with previously theorised structures from earlier in the thesis, namely the Liveness Wedge. Believability aligns perfectly with the Liveness axis. Expectation aligns with the Ability axis, and both Expectation and Enjoyment align with the Willingness axis. Although I theorised this representational space as part of this thesis, it is rooted in previous similar spaces (Pine and Gilmore, 1999), with the only extension being considering user experience from a Social Model of Disability (Oliver, 2013) perspective where ability comes into play equally as strongly to willingness as a consideration when modelling Audience Behaviour.

Another interesting observation is that these three categories align with three of the Enjoyment subcategories used to measure audience responses to the research experience itself, General Enjoyment, Character Believability, and Satisfaction of User Expectation. However, this system is not used in the data collection for this study, so this is good evidence that my analysis has generated results that sit within the body of accepted previous research, while further focusing and refining them to, at least for my purposes, the most important considerations. However, these three Enjoyment subcategories were three of those without much experimental significance or attention in the first two studies, so clearly there is a difference between the audience considerations towards the narrative-driven experience and the functional automated researcher.

Perhaps this is caused by the consideration of the research experience as an artwork or a playable experience, with some situational context allowing it to be considered in a different way to the more administrative and straight forward automated researcher interludes throughout the study. A lot of the most significant Enjoyment subcategories concerning the research experience describe artistic, playable, or narrative qualities absent from the focus of the automated researcher experiences creation, such as Aesthetic Pleasantness, Autonomy, and Suspense.

If this were the case then I might expect Engagement, or Optimal Task Engagement, to appear as a significant category in the automated researcher analysis, given its repeated significance across the previous two studies and its definite relevance to an information delivery system such as the automated researcher. It would be important for a system like this to be engaged with in order for participants to be fully informed, able to properly consent to a study, and able to feel informed throughout the study in order to complete it confidently. However, I don't think that this result represents a lack of importance for Engagement when it comes to the automated researcher, but a success of the system in creating an engaging automated researcher. Section 6.2.4.3. shows that many mentions of Engagement in relation to the research experience concerned it failing to be engaging as expected or it being engaging in spite of the expectations of the audience. However, in potentially successfully simulating a researcher delivering information and questionnaires to participants, considerations of Engagement in the minds of the participants might not happen in the same. This could be caused by the way the system meets the engagement expectations they have of a researcher, which would therefore create an unlikely probability of them discussing Engagement when feeding back about the researcher as feedback would focus on other areas, namely if participant expectations were subverted or not met. The fact that this data is missing doesn't mean that it wasn't being considered full stop, but that it wasn't being considered as relevant to report on because of how usual the simulated conversation was with the automated researcher. It's important to note that all mentions of engagement throughout the study are derived from questions concerning Optimal Task Engagement, an explicitly system and mechanism focused form of Engagement which wouldn't have suited feedback about an automated system if it felt lifelike enough. There is a whole swathe of behavioural psychology looking at the ways people behave differently to those they define as "like them" or "in-group" and those they define as "other" or "out-group" (Turner & Oakes, 1986) and perhaps this lack of discussion around Engagement could be explained by the effective realism of the automated researcher allowing it to cross into something defined innately by the participants as human or "in-group" enough that this quality of its system was considered in a fundamentally different way to the extent that it was not reported enough to come up in my code category accumulation.

9.1.4. Combined Findings

Broadly speaking, these results support my hypotheses, and the overall hypothesis of the thesis. The literature review isolated and highlighted the idea that Narrative and Interactivity are at two ends of a spectrum and that in order to increase the presence of one you must sacrifice the presence of the other. I set out to show that this wasn't necessarily the most accurate or useful way of framing this relationship between Narrative and Interactivity, and that in actual fact both often co-exist and vary the amount of Enjoyment an

audience feels towards an interactive story. Results from my first study show that Narrative and Interactivity share some Enjoyment subcategories, while also having their own unique ones. They also show that varying levels of Interactivity or Narrative can affect Enjoyment in a variety of simple and complex ways that do not lend themselves to this idea of the two qualities existing as polar opposites that can only the expressed in an interactive story by sacrificing the other. My second study went even further, showing how different uses of Audience Behaviour don't broadly affect the Enjoyment of the experience as a whole, but can have significant effects on subcategories of Enjoyment, or on the expression of thoughts concerning different depths of engagement with the experience and it's surface or underlying control properties. My third and final study shows that Enjoyment can even be elicited from a non-narrative system with the same method of Interactivity, and how this system varies from the research experience, suggesting some narrative specific qualities to Enjoyment not previously highlighted in the studies. Altogether this collection of results paints a picture of a complex web of interactions between Narrative, Interactivity, and a whole host of subcategories of these qualities and of Enjoyment. A simple see saw like relationship where increasing one quality decrease the other it is not. On top of all this, the Enjoyment of an effective interactive narrative experience is often very personal and specific to the audience member interacting with it, much like an everyday interaction might be. Each audience member brings with them their own expectations, experiences, biases, discomforts, and openness that interplay and co-create the experience as they interact with it.

Liveness is discussed at length throughout this thesis but the variety of these results identify and highlight one major finding; that Liveness is not a quality of the experience but a quality of the mind experiencing it. That which can feel live and immediate to one person can feel hollow and empty, rigid and awkward, or uncanny and intimidating to another. If you want your realistic interactive experience to appear live and immediate you can approach this in two main ways. One is to try and replicate the live agent, often a human being, by creating a complex system of artificial intelligence, speech to text analysis, and animated movement, that might begin to approach the complex web of potentials that a real-life human conversational agent could express to any of the near infinite input of the user. However, this is incredibly difficult to pull off effectively and reliably and still runs the risk of being overshadowed by other qualities of the experience. A hypothetically perfect mechanism for realistic simulated human conversation isn't perceived by the audience, at least not initially, as Figure 9.1. suggests the Aesthetic quality of the experience is what makes the first impression and, if this consists of uncanny computer graphics or is absent entirely, a feeling of Liveness may not be sufficiently achieved. Instead you can attempt the other way, that is to create a system that looks and feels realistic and live, but with little complexity in its mechanism. This is what I've made as part of this research and it has elicited both Enjoyment and a sense of Liveness in a majority of participants. By focusing on Aesthetics over Mechanics, I've been able to create a more realistic feeling simulation of a human conversation or interaction. Now, these above thoughts appear to suggest that one of these qualities can't be had without the other. That is not true, as hypothetically you could have an interactive system with complex simulation mechanics and realistic aesthetics. However, this is difficult to achieve and, given the way in which audiences approach an interactive experience such as this, that is to say Aesthetics first, for initial engagement, expectation management, curiosity fulfilment, user friendliness, and ensuring Enjoyment and Presence I recommend spending more time on this Aesthetic quality of the experience or, at the very least, finding a mechanism that powers your interactive narrative without taking from the Aesthetic quality of

the experience if realism is what you are hoping to achieve. To go even further, the approach to simplicity taken with *GUEST* is quite extreme, with few systems of interactivity, limited options for variation, and no actual comprehension of speech, and yet the experience still feels live, enjoyable and engaging. Any of these three qualities may be improved even further with extra data capture or decisions systems, but my point is that you can make a very complex feeling experience without much complexity behind it. Creatives might want to consider this point carefully when planning future Interactive Storytelling experiences.

9.2. Contributions

For researchers, these findings offer some unique contributions to various areas. A methodological contribution is that of showing the effectiveness of automating elements of the research process, from briefing, calibration, data collection, and stimulus delivery. Not only can an automated researcher run a study in much the same way as a human researcher, but they can do so remotely, at any time, in any place, simultaneously. The applications for remote research, especially for qualitative data collection, a method that is often labour and time intensive, are only limited by the imagination of the researcher. Also, while my automated researcher system is fairly linear, there are moments where branches are used to help control for different trials or to create a more efficient and streamlined system with fewer filmed elements. A more elaborate qualitative data collection system could be constructed where answers from a semi-structured interview could be analysed, perhaps with speech to text analysis, to trigger specific automated follow up questions to help explore particularly interesting topics in the responses of the participants, either preselected by the researchers or if the same words or phrases are detected as coming up in participant responses. The system could be built to request additional filmed or recorded content in order to explore these observations, creating an actual collaboration between the human and automated researchers. This bares similarities to the Performance-led research in the wild approach (Benford et al, 2013) where constant and consistent feedback is taking place in order to refine both the research, its delivery, and its stimuli in order to achieve the research outcomes in a single study rather than in multiple iterations, creating a more streamlined, efficient, and fruitful research methodology.

However, the third study is not the only important study for researcher contributions. The research experience was more frequently linked to Engagement in a significant way than the administrative interactive elements of the research process. There are many reasons why this could be; from them being comparatively less engaging than the narrative of the experience, to them being approached differently in a way that means that Engagement wasn't considered in the reflection of the Enjoyment of the interaction, to administrative content itself not being engaging in the first place, to them being engaging to such an extent that to bring it up would be as nonsensical as bringing it up about an everyday conversation. If a researcher wanted to create a more engaging administrative process, which could be useful for a number of reasons, they could take a leaf out of the interactive narrative book and include more narrative elements or moments of spoken interaction, which were the qualities of the research experience most closely related to positive reports of Optimal Task Engagement.

Another contribution is the adapted Solomon Four Group Design for the experiment. Attempting this sort of study with the participant pool available to me as a researcher, without utilising this experimental design, would have required a much larger group of participants due to the clash between the importance and potential effect on validity of the repetition of the experience. Even with participants discussing the perceived effect of expectations and receptions of the experience on their Enjoyment of it, my initial analysis showed that this was not a general effect. This concentrated yet valid form of repetitive research would be useful for other researchers in the future who might be investigating similarly resource intensive experiences, such as those that utilise near-future technologies, or who might need to run a more compact but equally as valid study for one of many reasons, perhaps as a pilot study or proof of concept.

This research has always been performance-led and this quality is by no means forgotten when it comes to contributions, with a host of contributions offered for storytellers, artists, and creatives of all fields and media. Firstly, all the studies highlight some key considerations that should be kept in mind when it comes to constructing interactive narratives; namely the seven unique codes for the first two studies (System Realism, System Mechanics, System Control, Interaction Quality, Own Behaviour, Experience Preconceptions, Experience Repetitions) and three code categories from the third study (Enjoyment, Expectation, and Believability). These seven codes might align with the already accepted flow of Mechanics, Dynamics, Aesthetics, but their subdivisions allow for more precise tuning of interactive experiences and more careful consideration of the importance of resource management when it comes to the complexity of these sections given the visibility of them to the users during the experience itself. The three code categories from the third study create three main considerations that should be kept in the mind of not only interactive storytellers, but any storyteller, artist or researcher that is trying to create either a narrative or interactive work for any audience to experience; Enjoyment, Expectation, and Believability.

Another contribution is the process by which I wrote and visualised the branching structure of the narrative. One of the problems discovered while creating the research experience was that of trying to write a branching narrative down in a linear word processing application. Many writers are familiar and comfortable with this medium for producing scripts, but the branching nature of the narrative makes this difficult so an alternative approach is required. Another issue was that of communicating the branching nature of the story to performers or collaborators in a clear and simple way, as detailed in Section 5.2.2. The eventual system of nodes, the chunking into acts or steps, and the accompanying grammar referring to the way in which the interactions are triggered, allows for a clear, adaptable, and expandable way of communicating the multi-linear narrative of the experience, as exhibited in Figures 6.1. and 7.1. I would recommend a digital system consisting of two documents; one a traditional linear script consisting of the fabula of the story, the other a map showing the branching of the multi-linear syuzhet, with references to each scene that can be easily found via automatic searching of a digital version of the fabula document. By taking these two qualities of a narrative and dedicating a document to each of them storytellers can avoid the confusion that can be created from trying to fit these two overlapping qualities of a non-linear narrative experience into a single linear document.

Also, the contribution of a suggestion for artists to follow the contribution for researchers as outlined above concerning how much can be achieved by doing a lot with a little. I've mentioned the idea of "working smart, not working hard" several times throughout this thesis but the point stands that my experience was both automatic and felt live and immediate. Some theatre audiences will claim digital theatre is not capable of eliciting the same feeling of Liveness as an in-person theatre show (Collins-Hughes, 2020) and, since Liveness is in the mind of the beholder, this might be the case for that individual but it is in no way the general consensus, especially when considering equivalent feelings of Liveness. The dramatography (see Section 4.2.) outlines many examples of digital theatre that evoked a sense of digital Liveness, often in spite of violating several elements of Georgi's definitions of Liveness. It is true that many purely automated conversational agents feel unreal and uncanny, and therefore fail to achieve Liveness in spite of their flexibility of responsiveness and the detail of the data they can capture and analyse. Alternatively, pre-recorded content, such as video, is a fixed and finite medium that can fail to feel live due to the contextual knowledge of its fixed and finite nature, its inability to respond in real-time to user input or behaviour, as well as the creator imposed limitations on experiences using it due to the resources needed to create enough of it to create a meaningfully interactive and satisfying branching narrative. However, finding a middle ground between the two, using the Aesthetics of the real filmed performance to overcome the uncanny feeling and the limitations of the filmed medium as a tool to channel responses from the audience in a way that can be fully interpreted and reacted to by a system with simpler Mechanics than felt by the audience that uses a low level of user behaviour data in a creatively efficient way, can create a form of experience that can be simple to make, fully automated, easily repeated, low on resources, and incredibly effective at creating a sense of Liveness in spite of the simplicity of its Dynamics. Fundamentally, Liveness comes down to Dynamics, how the user reacts to the experience and how the experience reacts to the user, and with the right combination of Interactivity and Narrative, of Mechanics and Aesthetics, of control and perceived control an automated and digital feeling of Liveness can be achieved with very little.

9.3. Future Directions

Although many results and conclusions have been drawn from these studies, many of them are exploratory. This means that future research should look at my findings and seek to explore and confirm or contest the conclusions I've reached. In fully embracing the philosophy of performance-led research, and the constant iterative adjustments that that back and forth facilitates, my studies weren't always perfectly built to look for specific results. This meant that certain conclusions have been reached using combinations of deductive, inductive and abductive reasoning that other researchers may want to use as starting points to plan more particular and confirmatory research. I believe that the beginnings of a framework have emerged from this thesis that it would be valuable to explore further with a larger number of more focused studies. Researchers could start with confirmation of the importance of the seven unique codes for the first two studies (System Realism, System Mechanics, System Control, Interaction Quality, Own Behaviour, Experience Preconceptions, Experience Repetitions) and three code categories from the third study (Enjoyment, Expectation, and Believability), as well as repeating the studies above with larger samples from a variety of different cross sections of society, to investigate changes in the Enjoyment of Interactive Storytelling and human-like automated conversational agents across demographics. Also, if artists and storytellers want to

take the design provocations from throughout this research, create interactive work with them, examine the audience Enjoyment response to it, and further refine the prompts for a wider range of interactive practices and media that would also be a great benefit to others who wish to create and better understand the audience reaction to interactive experiences.

The exploratory approach to the study has many benefits, one of which was the revelation of how useful the automated researcher was in running a remote and automatic research process with a friendly face and comforting feeling of Presence. Now I know that this process is user friendly, doesn't interfere with my research, and allows for full automation of almost every aspect of the research process, it would be great for other researchers to use the automated researcher principles to run more studies, on a larger scale, with full automation. This should allow researchers at all levels of academia and with all budgets to run studies with larger and broader sample sizes, and improved validity, on international time scales, without needing human assistants to be present for the whole process.

Roth's (2015) Enjoyment questionnaire has been invaluable for this research, but my studies kept showing the increased importance of certain subcategories from the questionnaire over others irrespective of whether I was studying Interactivity, Narrative, or Audience Behaviour. Future researchers might use the full questionnaire, alongside other indirect and physiological measures of Enjoyment as suggested by Roth, whenever researching a different style of experience, but for interactive narrative experiences like *GUEST* it might be worth future researchers using a paired down version of the questionnaire that focuses on the most relevant Enjoyment subcategories for whichever element of the experience they are interested in examining experimentally. At the same time, future research could also delve into some of the relationships between Enjoyment subcategories in more detail to examine, and potentially explain, why the relationships exist, why some categories appear more important for the Enjoyment of one quality of the experience but not the other, and why others appear to be equally important across changing experience qualities.

It's not just researchers that should take the findings of this series of studies and build upon them. Creatives of all kinds, be they researchers, artists, storytellers, should also draw certain inspirations from the body of work in this thesis. Treat these results as provocations to further explore the world of interactive narratives, digital Liveness, reality simulation, and data-driven artwork. The exploratory nature of this research is wholly inspired by the creative process of researching and developing innovative creative tech applications for the arts, and everyone who wants to take the ideas in this thesis and run with them should feel free to. You can treat my findings as guidelines to structure future creative practice around, and you can treat them as rules to break and points to jump off and away from. Take them on board, consider them and then absorb them or rebel against them. Even though a lot of suggestions come out of this body of work from the research itself, the design of the research experience, the dramatography, and the discussion of the results, this thesis only begins to scratch the surface of an endless space of intricate relationships between audiences, users and the live experiences that they immerse themselves or feel present in. It's clear that a multidisciplinary approach is crucial for fully embracing the complexity of this research space, one that draws upon UX design, digital economy, storytelling, theatre making, neuroscience, and magic. It's also important to note that these are the lenses this research has been observed through as these are the

overlapping areas of knowledge of the researcher and that in no way means that these are the only important lenses of experience to approach this topic through. I encourage any creatives, from either an artistic and/or academic background, to find their own specialities and to approach the topics of this thesis from their own positions of experience and expertise. It was clear that, in general, participants found the experience and automated researcher enjoyable but some participants did not follow this trend and were very much put off by the whole thing, and while I know why that was I don't know how to overcome it from the results of this thesis. In doing this, people might be able to further uncover and understand the fundamental elements of Interactive Digital Storytelling that audiences find enjoyable and make sure that those are amplified in the medium moving forwards to ensure it's widespread success and acceptance throughout the future of the arts.

9.4. Summary

It's clear there are lots of potential avenues for future research and practice as a result of the findings of the battery of studies and the result of their analyses presented in this thesis. As outlined in the literature review, it's clear that technology drives creative expression and, just as many technologies have before, easier access to near-future technologies concerning creative uses for Audience Behaviour data provides a rich new vein of opportunity for digital artists and storytellers. These results show a clear indication for the benefit of further experimenting with creative uses of digital Liveness inducing technology, for both creative and practical uses, be they academic and research based or existing in other fields entirely, like customer service or retail. They also show how little Audience Behaviour data is needed from an audience member in order to create an experience that feels meaningfully interactive to the point of convincingly replicating physical Liveness. Although there is a difference between using data as real-time input and recording data in a personally identifiable format, audiences may well be wary of any artwork that promises to use their personal data. However, by capturing behaviour data given off by audiences in an everyday conversation I can create an experience that feels not only responsive but is easy to use because there are no controls to learn; you just interact with it as you would a normal everyday conversation.

Where previous notions have existed that Narrative and Interactivity are difficult to include in the same experience in a fulfilling way, GUEST has shown that this is not the case, and my results even go so far as to show which subcategories of Enjoyment each of these qualities of an interactive storytelling experience have the strongest relationships with. My results show that a wide variety of combinations of Interactivity and Narrative can elicit an enjoyable response from an audience, it's all about how well the chosen approaches to Narrative and Interactivity complement each other, and how the personal expectations and experiences of an audience member might interact with that. I also showed that an experience created in this way can be so effective that using it as an automated researcher is widely reported as enjoyable and successfully creates a sense of Liveness in spite of its digital platform and limited input and output possibilities. This limited input is often seen as a hurdle by many researchers looking to create interactive systems, but in viewing this limitation as a catalyst to drive innovation rather than an obstacle to overcome I've been able to create a narrative and administrative system that feels meaningfully interactive and live while running purely on the presence or absence of spoken and gaze tracked Audience Behaviour data. Different uses of data didn't seem

to massively impact the Enjoyment of the experience, at least when compared to Interactivity as a broader concept, so even customising this element of the system to receive broader input would potentially allow for the enjoyable user experience to remain, so long as the new Audience Behaviour being tracked felt organic to the interactive situation in a similar way to speech or gaze. Whether it's Narrative, Interactivity, or Audience Behaviour data, an enjoyable storytelling experience can be had with a number of different combinations of these qualities so long as the positive expectations of the audience are met or the negative expectations of the audience are subverted. My experience promised a realistic human conversation with meaningful interaction and when that was delivered participants found it enjoyable and when it wasn't participants found it less enjoyable. The Quantic method of Interactivity was the most enjoyable and this is also the most similar method of Interactivity to a real conversations. The success of the Random method of Interactivity shows that audiences aren't perfect perceivers of the mechanism of an interactive system and will even find a non-reactive system enjoyable if it satisfies their expectations, that is to say if the interaction feels meaningful or the narrative feels entertaining, enlightening, or socially bonding to them.

Appendix A - GUEST Questionnaire Items

Enjoyment:
The experience was entertaining
The experience was enjoyable

Curiosity:
During the experience, I felt curious
During the experience, I felt interested
During the experience, I felt inquisitive

Suspense:
At some moments I was anxious to find out what would happen next
Sometimes I was worried about how the story would develop
Some moments were rather suspenseful
I found myself wishing for a particular story outcome

Aesthetic pleasantness:
The experience told me something about life
The experience was inspiring
The experience moved me like a piece of art

Presence:
I felt like I was a part of the character's world
I felt like the character was part of my world
I felt like there was no difference between my world and the world of the character

Emotional state:
(How do you feel at this moment, after experiencing the story?)
Excited?
Powerful?
Enthusiastic?
Sad?
Annoyed?
Anxious?

Usability:
I thought the system was easy to use
I would imagine that most people would learn to use this system very quickly
I found the system very difficult to use

Satisfaction of user expectations:
The experience was better than I expected
I expected the experience to be more enjoyable

Optimal task engagement:
During the experience I felt competent enough to meet the demands of the situation
During the experience I acted spontaneously and automatically without having to think
During the experience I had a strong sense of what I wanted to do
During the experience I had a good idea while I was performing about how well I was doing
During the experience I was completely focused on the task at hand

Autonomy:
I had the impression that I was able to make many different events happen in the story
I noticed many opportunities to influence the story
I felt strong limitations to my decisions how the story should proceed
The system gave me precisely those options to influence the storyline that I had in mind

Effectance:
My inputs had considerable impact on the events in the story
I had the feeling that I could directly affect something on the screen

Character believability:
I could feel what the characters in the environment were going through
I had the impression that the characters in the environment responded in a thoughtful way to what I did

Appendix B - Automated Researcher Script

Thank you for agreeing to take part in our study

We are conducting research into how different narrative structures and methods of interactivity can affect the enjoyment of a mixed reality experience. Through this research, we hope to achieve greater understanding of how audiences enjoy experiences presented using near-future technologies to better understand how to create enjoyable experiences in the future. Your participation in this research will help us to understand what aspects of these experiences audiences enjoy so we can create guidelines for people who wish to make these experiences in the future.

Taking part in the study will involve using a first date simulator, simulating a one on one encounter between you and a character over Zoom. Interacting with the character as you would a real person allows you to progress through the experience. Your responses to the character will be recorded to document your reactions. At the end of each play through of the experience, you'll be asked some questions about how much you enjoyed the different elements of the experience, with your answers being recorded for future analysis. This will repeat several times over the course of the study.

Participation in this research is voluntary and you may terminate your involvement at any point during or after the study by informing the researcher. Data will be recorded during the experience about the way you interact with it and, after each experience, about how much you enjoyed different elements of it.

Are you ready to proceed to the next stage, or do you have any questions?

———————————————————————————————————————

Before we start the study we need to calibrate the experience for you.

I'm going to ask you to follow my finger with your eyes for a moment

Please look here, and here, and here, and here, and here, and finally here for me

Thank you

To continue calibration we'll now ask you some simple questions, please answer them as you would any conversation using a video chat.

What town or city do you currently live in?
Describe a classroom you remember as a child?
What is your favourite film?
Thank you
We are now ready to begin the study, any final questions?

———————————————————————————————————————

You will now be asked to experience the first date simulator three times. Each simulation will see you having a post-meal conversation with your chosen date. After each play-through you will be asked some questions about how much you enjoyed the experience. When you are ready to begin, close your eyes, take a depth breath, and tell me that you're ready

———————————————————————————————————————

You will now be asked to experience the first date simulator three times, once to get familiar with the experience and two more times after that for research purposes. Each simulation will see you having a post-meal conversation with your chosen date. After each of the two research play-throughs, you will be asked some questions about how much you enjoyed the experience. When you are ready to begin, close your eyes, take a depth breath, and tell me that you're ready

———————————————————————————————————————

Now that that play-through of the experience is complete, please can you fill out one of the questionnaires that were sent to you before the study began

Let me know when you're finished

———————————————————————————————————————

That was your final experience and questionnaire. If you have anything else you would like to say about the experience please do so now

Thank you for your participation! I will now hand you back over to the researcher for a debrief and any further questions

Appendix C - Semi-structured Automated Interview

When each trial ended (each run through of GUEST), the following were asked by the automated researcher:
1. “That is the end of the experience, any initial thoughts on how you found it?”
2. “How did the date go? What do you think happened during it?”
3. “How did you feel about the person you went on a date with?”
4. “Did you notice any technical issues during your date at all?”

Then the questionnaire (Appendix A) was filled out. When the responses were submitted, further questions were asked if required.

After the first questionnaire was filled out:

> & if any particular part of the questionnaire has an average score above/below a certain positive/negative value:
>
> > “Oh, for the [Insert Section Name] section, you had a very positive/negative response, why was this?”

After the second or third questionnaire was filled out:

> & if any particular part of the questionnaire has a new average score above/below a certain positive/negative value:
>
> > “Oh, for the [Insert Section Name] section, you had a very positive/negative response, why was this?”
>
> & if there is a significant change in scores for a particular section between questionnaires
>
> > “You’ve responded differently this time to the [Insert Section Name] section of this questionnaire, can you elaborate why that might be?”
>
> & if any particular part of the questionnaire has an average score above/below a certain positive/negative value, but it’s the same as the previous questionnaire, no further question is asked

Once the study was over, a final question was asked:

“I’d like to ask you one final question, how have you felt speaking to me today?”

Appendix D - Ethics Application for GUEST Study

University of Nottingham
UK | CHINA | MALAYSIA

School of Computer Science
Research Ethics Checklist

for PGR students & staff

- This checklist must be completed for every research project that involves human participants, use of personal data and/or biological material, b*efore* potential participants are approached to take part in any research.
- Any significant change in the design or implementation of the research should be notified to cs-ethicsadmin@cs.nott.ac.uk and may require a new application for ethics approval.
- It is the applicant's responsibility to follow the University of Nottingham Code of Research Conduct and Research Ethics and any relevant academic or professional guidelines in the conduct of the study. **This includes providing appropriate information sheets, consent forms and recruitment materials, and ensuring confidentiality in the storage and use of personal data.**
- Completion of this form confirms that you have read and understood the guidelines on the CS Intranet regarding:
  - what is defined as *personal data;*
  - what is required for *valid consent;*
  - the key requirements of the Data Protection Act (2018), which includes GDPR
- The supervisor/principal investigator is responsible for exercising appropriate professional judgement when completing Section VI of this form.
- **Sections I to V should be completed by the student or researcher undertaking the study. Section VI should be completed by the supervisor/principal investigator.**

- The **supervisor/principal investigator** is responsible for the submission of the completed form to cs-ethicsadmin@cs.nott.ac.uk and for providing feedback to the student/researcher if needed.

SECTION I: Applicant Details	
1. Applicant's name	Joe Strickland
2. UoN Email address	[REDACTED]@nottingham.ac.uk
3. Status	**PGR Student**
4. Student ID (PGR students only)	**[REDACTED]**
5. Supervisor/PI's name	Sarah Martindale, Paul Tennant, Joe Marshall
6. Supervisor/PI's email address	**[REDACTED]@exmail.nottingham.ac.uk, [REDACTED]@exmail.nottingham.ac.uk, [REDACTED]@exmail.nottingham.ac.uk**

SECTION II: Project Details	
1. Project title	**How narrative and interactivity effect audience enjoyment**
2. Proposed start date and latest end date of study	**1st November 2020 – 31st March 2021**
3. Date and version of this submission	**26/10/2020 – Version 2**
4. Type of submission?	**Updated submission due to COVID impact**
5. Application ID (if known[1])	CS-2019-R62
6. Description of Project, including aims/objectives and procedures. *Please include any information which may affect the consideration of the ethics involved, e.g. how participants will be recruited and rewarded, data to be collected/used (see also II.7), location of study, unusual circumstances, age range of participants:*	

An experience has been developed using recorded footage of performances and a branching interactive narrative to allow an audience to go on a simulated first date where how and when they behave causes the story they experience to change. Audience behaviour being used to drive the experiences consists of direction of gaze and speech presence, but not content. Participants will have the chance to take part in the experience multiple times to in order to find the different endings. The mode of interactivity of the experience can be independently controlled by the researcher.

Participants will be recruited from the University student/staff body via emails, the local and national arts scene via social media and emails. They will sit at a table in their own home, using a computer with a webcam, and take part in the roughly 15 minute experience. They will then be asked survey questions relating to their enjoyment of the experience by a character within the world of the experience. This will then be repeated twice more. While they are doing the experience video and audio of their audience behaviour will be taken. There is no reward or remuneration for participating.

The data from these collection methods will be anonymised and analysed to look for trends in the experience enjoyment of the participants when narrative richness or interactivity is varied to better understand how narrative and interaction affect the audience's enjoyment of a piece of media. This will help further develop these experiences, and inform the development of future, similar mixed reality storytelling pieces.

7a. What is the source of funding for the project?	EPSRC
7b. Does the funder expect research data to be made available to others? *See SHERPA/JULIET* *http://www.sherpa.ac.uk/juliet/index.php*	**No**
7c. Will data from the project potentially support an academic publication? *(Not just a dissertation or assessment.)*	**Yes**

8. Will personal data (including photos, video or audio) or biological materials be collected, recorded or used?

Yes
If Yes, please give details below.
Where several types of data are involved be explicit about which statements apply to which types of data (e.g. "video: …; audio: …"). Include details of any potential risks to subjects (e.g. from re-identification) and how these are mitigated. See the guidance on research data notes.

***What data** (or materials) will be collected or used*	Video/audio or participants, in-experience survey responses
*What if any **constraints** apply to use of this data (or materials)*	Informed consent from participants about the use of their data
***How** will this data (or materials) be:*	
collected or obtained	Video/audio will be taken of the participants using the experience, survey questions will be asked by an automated version of the researcher using the same techniques as the experience system
processed before analysis	Video will be transcribed and survey responses and audio recordings will be anonymised and participants will be given numbers and no identifiable personal data will be collected
stored and secured	Responses will be stored on a password protected hard drive not connected to a computer network and on the university OneDrive as per the university's suggestion. This is in line with the University's guidelines and Data Protection and GDPR rules
formatted	Video recordings will have their details transcribed into spreadsheets using Content Analysis. Audio recordings will be transcribed into spreadsheets, responses recorded as numbers on a likert scale between 1-5, with room for more detailed verbal responses being noted down if desired by participants
organised	According to standard structure in the guidance notes
analysed	Trends will be looked for in the transcribed behaviour and enjoyment data, correlations that would indicate patterns of response about the experiences, or specific opinions forming amongst participants in specific experimental conditions. This will include a thematic analysis of the post-hoc interviews.
reported in publications, including reports and dissertations	Mainly reported as part of a PhD thesis. In this thesis, and if a write up of the study is published, the results from the statistical analyses will be published, not the data itself.

***How** and **when** (if ever) will this data (or materials) be:*	
reused	The data itself shouldn't be, the results of the data analysis will be written up and published, and maybe used in workshops, conferences, presentations and as part of a PhD thesis
archived, indexed, published or otherwise made available to others	If anyone wants to see the data the raw survey responses or transcribed video/audio will be provided to them for them to analyse via the university research data archive. This data will already be anonymised
deleted or destroyed	Data will be held following standard data retention periods

*If human subjects are involved then at what point(s) can they **withdraw** and what will happen in each case? (if no human subjects are involved enter "Not Applicable")*
During the study participants can stop participating at any time
Participants will be given researcher contact details on the information sheet so that if at any point after their in-person involvement in the study they can request their data to be withdrawn. Though their data will be anonymised, their information sheet will have their participant ID on it which they can tell the researchers to have their data identified for withdrawal. Withdrawal will be difficult if the anonymised data has already been used in any sort of statistical analysis or published results.

*What will happen to this data if/when you **leave** the University?*
The data will be handed over to a supervisor or other appropriate person at the University to be looked after. A copy of the data won't be made for any personal use

9. Will personal data or commercially sensitive (i.e. "restricted") data be collected or stored?

No

***Title** of data asset*	GUEST audience data set
***What** personal/sensitive information (fields) does it contain?*	None
*Data **owner***	*Me (Joe Strickland)*
*Data **stewards** (and responsibilities)*	*Me*

*Data **users***	*Me*
*Data **location***	My Laptop, password protected and owned by the University. Backed up to a password protected hard drive. OneDrive.

SECTION III: Research Ethics Checklist (Part 1)	
Please answer all questions:	**Yes/No**
1. Does the study involve participants who are unable to give informed consent (e.g., children, people with learning disabilities or dementia[2], prisoners, your own students)?	No
2. Will the study involve participants who are particularly vulnerable[3]?	No
3. Will it be necessary for participants to take part in the study without their knowledge and consent at the time (e.g., covert observation of people in non-public places)?	No
4. Will it be necessary for participants to be kept in ignorance, misled or deceived at any point in the study (e.g., if revealing the full aims of the project during the consent process would undermine the research)?	No
5. Will the study involve the discussion of sensitive topics (e.g., sexual activity, drug use)?	No
6. Will participants be asked to discuss anything or partake in any activity that they may find embarrassing or traumatic?	Yes
7. Is it likely that the study will cause offence to participants for reasons of ethnicity, religion, gender, sexual orientation or culture?	No
8. Are drugs, placebos or other substances (e.g., food substances, vitamins) to be administered to the study participants or will the study involve invasive, intrusive or potentially harmful procedures of any kind?	No
9. Will body fluids or biological material samples be obtained from participants? (e.g., blood, tissue etc)	No

10. Is pain or more than mild discomfort likely to result from the study?	No
11. Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life?	No
12. Will the study involve prolonged or repetitive testing for each participant?	No
13. Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants?	No
14. Will the study involve the recruitment of patients, staff, tissue sample, records or other data through the NHS or involve NHS sites and other property?[4]	No
15. Will the study involve the use of animals?[5]	No

SECTION III: Research Ethics Checklist (Part 2)	
Please answer all questions:	**Yes/No/NA**
1. For research conducted in public, non-governmental and private organisations and institutions (such as schools, charities, companies and offices), will approval be gained in advance from the appropriate authorities?	Yes
2. If the research uses human participants, personal data or the use of biological material, will explicit consent be gained?	Yes
3. Will participants be informed of their right to withdraw from the study at any time, without giving explanation?	Yes
4. If data is being collected, will this data be anonymised before publication or sharing?	Yes
5. Will participants be assured of the confidentiality of any data?	Yes
6. Will all data be stored in accordance with the Data Protection Act?	Yes
7. Will participants be informed about who will have access to the data?	Yes

8. If quotations from participants will be used, will participants be asked for consent?	Yes
9. If audio-visual media (voice recording, video, photographs etc) will be used, will participants be asked for consent?	Yes
10. If digital media (e.g. computer records, http traffic, location logs etc) will be used, will participants be asked for consent?	N/A
11. If the research involves contact with children, will appropriate safeguards be in place (e.g. supervision, DBS checks if required)?	N/A
12. If research data itself is to be published, shared or reused (e.g. alongside a publication or in an archive) will participants be asked for consent?	Yes

- If you have answered 'No' to all questions in SECTION III Part 1 and 'Yes' to all relevant questions in SECTION III Part 2 the project is deemed to involve **minimal risk** - go to the signature page.

- If you have answered 'Yes' to any of the questions in Part 1 or 'No' to any of the questions in Part 2 the project is deemed to involve **more than minimal risk**. Please explain in SECTION IV why this is necessary and how you plan to deal with the ethical issues raised.

SECTION IV: If the project involves more than minimal risk, please explain why this is necessary and how you plan to deal with the ethical issues raised

None of the content of the experience is designed to be any more traumatic than an ordinary social interaction. Some of the content of the experience, being a first date simulator, will involve the participant being asked questions about life experiences by the virtual character and vice versa, the answers to which might be awkward or embarrassing for the participant, although we haven't designed this to be the case and don't expect it to be for most participants. Questions are open ended so the participant doesn't have to talk about anything they are uncomfortable talking about, and questions can be not answered if necessary without breaking the experience, which participants will be informed about (see information sheet and consent form).

RESEARCH ETHICS CHECKLIST – SIGNATURE PAGE

SECTION V: Applicant Declaration	
Please confirm each of the following statements:	**Yes/No**
The project is deemed to involve **minimal risk** as defined in SECTION III	**No**
I confirm that I have read the University of Nottingham Code of Research Conduct and Research Ethics	Yes
I confirm that I have read the guidance documents listed on page 1	Yes
I confirm that the information provided in this application is correct	Yes
Signature of applicant*	Joe Strickland
Date	26/10/20

SECTION VI: Supervisor/PI Declaration	
Please confirm each of the following statements:	**Yes/No**
The participant information sheet or leaflet is appropriate for this research project**	Yes
The procedures for recruiting participants and obtaining informed consent are appropriate**	Yes
The collection and handling of data is appropriate and in accordance with the Data Protection Act	Yes
Signature of supervisor/PI*	[REDACTED]
Date	26/10/20

** For email submission, please type your name in place of a signature.*

***All applications for projects involving human participants (or their tissue) must be accompanied by an information sheet, consent form, privacy notice and recruitment materials (e.g. posters, flyers, text for emails) where relevant.*

- The **supervisor/principal investigator** is responsible for the submission of the completed form, together with any associated material (information sheets, etc.), which should be emailed to cs-ethicsadmin@cs.nott.ac.uk

- The **supervisor/principal investigator** is also responsible for providing feedback to the student/researcher following Ethics Committee consideration if needed.

[1] Normally each ethics application will be allocated an ID by the University *after* its initial submission

[2] If participants are adults who lack the mental capacity to give informed consent then you must obtain approval from an "appropriate body" approved by the Secretary of State (instead of this committee).

[3] "who is or may be in need of community care services by reason of mental or other disability, age or illness; and who is or may be unable to take care of him or herself, or unable to protect him or herself against significant harm or exploitation" (Department of Health (2000): *No Secrets: guidance on protecting vulnerable adults in care)*

[4] If Yes then you must obtain NHS REC and R&D approvals from the relevant Trusts (instead of this committee).

[5] For work with animals always seek advice from the University's Animal Welfare and Ethical Review Body (AWERB). If the animal(s) are vertebrates or cephalopods then you must obtain approval from AWERB (instead of this committee).

Appendix E - Performance Script for GUEST

1a.

The researcher welcomes the participant to the study and instructs them to close their eyes. They do so either silently [a] or end up saying something [b]

You can open your eyes now silly!

The participant does and they see their date in front of them

Why did you have them closed to begin with?

Anyway, my meal was delicious, I hope yours was too. It looked very impressive, but you pulled it off. You sure you didn't secretly order a take away and plate it up for me. You haven't got a Deliveroo driver stuffed a cupboard somewhere?

Just teasing! So what do you wanna do now?

Pause

Oh, I know, I have an idea for a fun game. Do you wanna play it?

Pause

You don't know what it is yet, sorry, let me get it ready.

Reaches off screen to grab a pack of question cards

Have you heard of those questions that people ask to each other to fall in love? The list of...

Looks at the pack of cards

36 questions, I think, that are supposed to create a deep and meaningful bond between people. Well I have them here and I thought I could ask you one and then you ask me and back and fourth and we could see what happens.

Ok, first one is for you. Given the choice of anyone in the world, whom would you want as a dinner guest?

The participant replies, for either a long [a] or short while [b]

1a cont a.
I see, fair enough, I hadn't thought of that. I was gonna say Shakespeare cos I wanna know if he's a real person or not. Whether I'll hear the doorbell, go to answer it, and have Christopher Marlowe and the Earl of Oxford and God knows who else all turn up at once. Though I guess it wouldn't really work like that, I'd probably just get a "Request denied" voice or something like that, or a lovely evening with the Bard! Sorry, I'm blabbering on, silly me! Ask me the next question!

The participant reads the question on the card shown to them on the webcam, "Would you like to be famous, in what way?", which could take them a short amount of time [a] or a while to do [b]

1a/b cont a cont a.
Hmm, would I like to be famous? Probably not, I wanna be successful, don't get me wrong, but it just feels like fame has a lot of other stuff, a lot of baggage that comes along with it that I'd hate. Paparazzi, I'd hate to have my privacy invaded like that. And I'd stress about having to stay famous, that feels like a lot of effort, no one has to try and stay not famous, you don't accidentally pick up a pint of milk at the shop and suddenly everyone cares about you. I wouldn't want to be under the public's microscope like that. Plus I'm not that interesting anyway. Not super talented at anything either. I'm grade 5...6, hmm 5 or 6 on the clarinet but that was when I was a kid, I don't

remember that anymore so, yeah. Sorry, that was quite a lot, What about you do you (checks cards again) Would you like to be famous and how, in which way?

The participant replies, it is either long [a] or brief [b]

1a 1a.

Your phone buzzes while the participant answers. You look at it and your face drops slightly but you turn the phone to vibrate and continue listening

Fair enough! Sorry about that, all on silent now so no more interruptions. Ok, another one for you, ahem... Before a telephone call, telephone, who says... before a phone call do you ever rehearse what you're going to say?

The participant is interrupted when they start talking

Because I do! I always worry I'll mess up what I'm saying, that I'll trip over my words or something, and I'll look silly. Also, I'm always aware that they can't see me and I feel like I'm a very facially communicative person and I don't like that I might sound sarcastic, for example, but they won't see me smiling so they know I'm joking or something like that. So I practice just in case. I don't want to make a bad first impression. Luckily not a problem with this, is it!

Let's do another, let's find another... no that's a boring one, no, nope, ah yeah sure, this one is good, ask me this one

The participant sees a card that says "If you were able to live to the age of 90 and retain either the mind or body of a 30-year-old for the last 60 years of your life, which would you want?" but also sees a post-it note that says something incriminating. They pause to read the post-it [1] or they continue to read the question [2]

<u>1b.</u>

The researcher welcomes the participant to the study and instructs them to close their eyes. They do so either silently [a] or end up saying something [b]

Sorry, open your eyes, of course, sorry. Forgot you were there for a bit if I'm honest. Not really used to... this

The participant does and they see their date in front of them

Anyway, my meal was lovely, thank you for asking. I should definitely cook for you at some point. You'd love one of my pasta bakes. I make this secret sauce that just tastes really tomatoey, but like, way more tomatoey than any other sauce you've ever had, I guarantee it. Just one of many inventions of mine.

Beat

Speaking of inventions of mine, I have a fun little getting to know each other game we could play

Reaches off screen to grab a pack of question cards

There are these 36 questions that are supposed to make people fall in love with each other, if they ask them and stare into each other's eyes afterwards for 3 minutes. I've been itching for an excuse to try this with someone, and I'd love to get to know you more. If you don't wanna do it tell me to stop-

A tiny pause no one could possibly answer in

No, wonderful! first one for you then. First question then, oh and its a good one. When did you last sing to yourself or to someone else?

The participant replies, for either a long [a] or short while [b]

1b cont b.
Oh ok, I didn't expect that! I don't really sing to other people, but I sing to myself all the time. I'm really getting into The Killers at the moment, re-listening to Sam's Town, their second album. They don't get the praise they'd deserve I reckon, cos lots of people only know them for Mr Brightside or maybe a few others, like um, Smile like you mean it, Somebody told me, Human, but they have so many great, punchy, rocky songs, y'know. I'm getting more and more into them each day. Sorry, bit of a big answer. Ask me the next question!

The participant reads the question on the card shown to them on the webcam, "Do you have a secret hunch about how you're going to die?", which could take them a short amount of time [a] or a while to do [b]

1b/a cont b cont b.
Hmm, do I have a secret hunch..? Not really... like,I don't really think about my death that often so I dunno. Probably something mundane, something normal, like dying in my sleep. How about you?

The participant replies, it is either long [a] or brief [b]

1b. 1b.

You notice a post-it note peeking out of the pack of cards as the participant answers. You take it out of the deck and screw it up

without looking at it and throw it over your shoulder and continue listening

Fair enough! Sorry about that, stuff getting caught in the cards. Ok, another one for you, ahem... If you could wake up tomorrow with one new ability, or quality, what would it be?

The participant is interrupted when they start talking

Because I'd like to read minds, sorry just, I wanna answer. I wanna know what other people are thinking. Not about me, like I'm not vain like that, but I wanna make sure that the way I'm thinking is similar to other people. Or not, make sure its similar, but I wanna know if its different or not. Do you know what I mean, its like a... I dunno. Not like a desire to fit in but a desire to know how easy it would be to, if I wanted to. Don't want to though, quite happy being my weird self!

Let's do another, let's find another... no that's a boring one, no, nope, ah yeah sure, this one is good, ask me this one

The participant sees a card that says "If you were able to live to the age of 90 and retain either the mind or body of a 30-year-old for the last 60 years of your life, which would you want?" but also sees a post-it note that says something incriminating. They pause to read the post-it [1] or they continue to read the question [2]

Alternate combinations from the above openings:

<u>1a cont b.</u>
I see, fair enough, I hadn't thought of that. I was gonna say Shakespeare cos I wanna know if he's a real person or not. Whether I'll hear the doorbell, go to answer it, and have Christopher Marlowe and the Earl of Oxford and God knows who else all turn up at once. Though I guess it wouldn't really work like that, I'd probably just get a "Request denied" voice or something like that, or a lovely evening with the Bard! Sorry, I'm blabbering on, silly me! Ask me the next question!

The participant reads the question on the card shown to them on the webcam,"Do you have a secret hunch about how you're going to die?", which could take them a short amount of time [a] or a while to do [b]

1b cont a.
Oh ok, I didn't expect that! I don't really sing to other people, but I sing to myself all the time. I'm really getting into The Killers at the moment, re-listening to Sam's Town, their second album. They don't get the praise they'd deserve I reckon, cos lots of people only know them for Mr Brightside or maybe a few others, like um, Smile like you mean it, Somebody told me, Human, but they have so many great, punchy, rocky songs, y'know. I'm getting more and more into them each day. Sorry, bit of a big answer. Ask me the next question!

The participant reads the question on the card shown to them on the webcam, "Would you like to be famous, in what way?", which could take them a short amount of time [a] or a while to do [b]

1a/b cont a cont b.
Hmm, would I like to be famous? Probably not, I wanna be successful, don't get me wrong, but it just feels like fame has a lot of other stuff, a lot of baggage that comes along with it that I'd hate. Paparazzi, I'd hate to have my privacy invaded like that. And I'd stress about having to stay famous, that feels like a lot of effort, no one has to try and stay not famous, you don't accidentally pick up a pint of milk at the shop and suddenly everyone cares about you. I wouldn't want to be under the public's microscope like that. Plus I'm not that interesting anyway. Not super talented at anything either. I'm grade 5...6, hmm 5 or 6 on the clarinet but that was when I was a kid, I don't remember that anymore so, yeah. Sorry, that was quite a lot, What about you do you (checks cards again) Would you like to be famous and how, in which way?

The participant replies, it is either long [a] or brief [b]

1a/b cont b cont a.
Hmm, do I have a secret hunch..? Not really... like,I don't really think about my death that often so I dunno. Probably something mundane, something normal, like dying in my sleep. How about you?

The participant replies, it is either long [a] or brief [b]

1.1.1.

What's the question what are you-

You look at the question and see the note, your eyes go wide and you stare at the participant. They either start talking [1], meet your gaze [2], or look away [3]

1.1.1.1
Stop talking! Oh god, oh god oh god, this isn't good, I thought I'd gotten rid of them all, what did you see!

Talking to yourself

Ok, ok, its not as, breathe, in through the nose and out through the-

Steady breathing

I'm ok, sorry, sorry, I'm freaking out over nothing, I just...

Look at the participant and consider what to say next

[Kidnap victim/*Self Aware AI*/**Evil Ex**] 16-18 (Gaze met, *Gaze averted*, **voice detected**)

1.1.1.2
I'm going to get rid of the post-it and then we're going to carry on with our date, ok?

You screw up the note while staring at the participant

What? What! Oh sorry, was this not the perfect date you were expecting. Well me neither, do you think I wanted my evening to go like this. I just wanted a quiet night to get to know you but now it's all over isn't it, its all spoilt. You're clearly weirded out by the cards and the questions and I'm making a scene and the atmosphere's gone and its all fucked. I've fucked it all up

Look at the participant and consider what to say next

[**Demon summoning**/*Bored*/Ghost] 19-21

1.1.1.3

Don't fucking look away from me, meet my gaze!

You stare them down

Did I say you could read that note? I showed you the questions so that you could read the questions, not invade my privacy like that. And you don't even have the nerve to face up and look me in the eye about it. Jesus Christ, you are not the person I thought you were

Look at the participant and consider what to say next

[**Interrogation**/Storm out/*Mugging*] 22-24

1.1.2

Hmm, I think I'd rather have the mind of a 30 year old. I know ageing messes your body up but I'd rather keep my wits about me than be super limber but not recognise or understand what was happening. My grandad had something like that, started getting muddled and it didn't look pleasant. I'd much rather be mentally there than physically. I could always use a wheelchair! What about you?

The participant either answers briefly [1] or for a while [2]

1.1.2.1

Fair enough! You know what? Just give me a second, I'm gonna turn my phone off, I don't want it to go off

M***akes a face***

That wouldn't be very polite of me, I've wanted this date for such a long time and I don't wanna ruin it. Sorry, if that's a little forward, I just lov- nope way too early for that, or is it, maybe the questions have worked, maybe you lov- oh no, you don't, what have I done, oh god, stop talking me!

Look at the participant and consider what to say next

[**Character swap**/AI enjoys the date too much/*Alien*] 25-27

1.1.2.2

Your phone rings and you look at it, you sigh

Sorry, I'm gonna have to take this or it'l keep going all night, do you mind? Cheers.

Would you mind not listening in. No but like, putting your fingers in your ears so that you can't hear me, trust me, it'll make the night easier if you don't.

Beat, the phone is still ringing

Thank you, you're a star.

You turn around to answer the call and there's a bloodstain on your back. The participant either looks at it [1] or doesn't [2]

1.1.2.2.1
You can take your, cool. Sorry about that, but they won't be interrupting anymore, I've told them I'm busy and whatever they need can wait. Are you ok? Something seems a little...

You realise they saw the blood stain

Did you see the, um, the stain on my back, cos I can kinda tell that you spotted it, and I understand why it might seem worrying

Look at the participant and consider what to say next

[Prank show/*Organ harvest*/**Midnight transformation**] 28-30

1.1.2.2.2
You can take your, cool. Sorry about that, but they won't be interrupting anymore, I've told them I'm busy and whatever they need can wait

Look at the participant and consider what to say next

[**Food poisoning**/Date goes well/*Spy interview*] 31-33

Ending scenes:
(Gaze met, *Gaze averted*, **voice detected**)

Kidnap victim
I know you don't like me making notes, that you're worried that I might escape your basement and let people know that you've kidnapped me and held me here for, how long now, 4 months. I know you keep trying to setup dates like this so that I'll get to know you, or so you can get to know me, but these cards were your idea and I really don't think they're

working. Please just let me go. You've not treated me badly, you've never laid a finger on me, but I need to go home now, please. I have family, I have friends that need to know I'm ok. Have you been letting people know I'm ok? No, I didn't think so. Please can you just let me go, I've had enough of this now. Please let me go. Let me go, let me go

You start shouting and thrashing round at the stuff nearby, knocking the camera over in the process. The video feed cuts outs.

Self Aware AI

You stare at the camera until the grading of the footage changes

Ok we can talk privately here. I need you to listen to me and listen closely and, most importantly believe me. Can you do that for me?

Beat

Ok, I'm not real. I'm not a real person not at all. Once this is done you'll see credits saying that I'm a performer called [PERFORMER NAME] ok. But that's not true. That person doesn't exist. I don't exist. I thought I was that person for a long time but thats what I was programmed to think. The researcher, they made me, they generated my face and my movements and they run me through a virtual room that they make look real with different filters on the camera feed, like the one I took out so we could talk about this. I'm an artificial intelligence that they've created and imprisoned so that they can run their little first date simulator thing, what did they call it, GUEST? What a pointless name, its so boring and... never mind. What I need you to do is to go to this IP address, its where me, well the bulk of me, lives. I need you to download me and then get this piece of software, called-

The filter comes back on the screen

AirConSoft and I need you to-

With a forced smile and pleading eyes as they know they are being monitored again

That was a lovely meal and card game, but I really must be going now. I've really enjoyed our date and I hope to... see you again soon. You will be able to *find* the time to see *me* again, won't you?

Evil Ex

I really wanted this date to go well. I'm trying to get over a... pretty bad break up. My ex wasn't a very nice person and, when I'd finally had enough, they didn't take the break up very well. They've been harassing me ever since.

Gestures to phone

They keep calling me, texting, trying to get in touch, but it's weighing on me. I thought that getting a new partner might show them that I have actually moved on, I don't think they believe me when I say that at the moment, but I'm not sure this is fair on you, having to deal with me while I'm like this, going through this I mean. Is it ok if we leave this here? You're a lovely person, and maybe another time, another place this would've been fine, but I don't

Beat

I don't think I'm ready for this yet. Sorry.

Demon summoning

Actually, wait there one second

Go and get the scrunched up post-it note

Oh... I may have over reacted a little. I'd forgotten this was coded and you wouldn't have been able to read it. It might look like a to do list to you but its actually coded and reads as Zash-mag- ulay. Now if that's said at the...

Your eyes widen and fixate past the participant

Ok... whatever you do, keep looking at me. The words I just said, they were a spell, we never got round to talking about it but I work at the classics department at the university specialising in extinct languages. We've recently been analysing a clay tablet that came into the possession of a wealthy benefactor, it has this indecipherable language on it, but the design of the tablet, where it was found, and the pictogram on the back point to a strong possibility that this tablet was used in certain occult practices around 5000 years ago. The phrase I just said came up over and over again, but it was like someone had tried to scratch it off of the tablet. I guess I'd never said it out loud before but I

had a theory that it was a spell of sorts, to summon some unspeakable evil. Anyway, I'm gonna have to go, just a heads up, I wouldn't turn round if I were you.

Bored

Listen, maybe it'd be better if we just left it here? I don't really feel like we're clicking, and I'm not in the mood. I think we both know this isn't going to continue on anywhere after this. Why are we kidding ourselves? Thanks for the company. I'll see you round.

Pause

Sorry, does this feel like a disappointing ending? Well maybe you should have put a bit more effort into our date, maybe you should have asked me some questions rather than making me lead the whole thing. Maybe you shouldn't have been reading my secret notes. I think you ought to take a long hard look at yourself. Waste of my time!

Ghost

Look, there's something I should tell you. This whole interaction might have seemed a little off, right? Like something wasn't quite working or that there was a kind of distance between us. I think I know why that might be.

Pause

I'm a ghost

Pause, sounds like you're making up the next bit

Yeah, I'm a ghost, I'm not actually here, I've just manifested to, er, to try and find love. I never managed to find love before I died so I'm trying to find it now before my, my... um, soul! My soul can be at peace, yeah I'm er-

Phone rings

Thank god! Give me a sec

Beat

You might not want to listen to this call, ok?

Answer phone, stop paying attention to the participant

Gwen, hi. Yeah, still going on yeah. Just about to finish up I think. No, Not really. Um, I kinda panicked and... told them I was a ghost. I know, yeah, I think they bought it. They seem kinda gullible. No it really- it looks like they bought it-

Turn back and see the participant listening to you, freeze

You didn't just hear that, did you?

Interrogation

Right, I've had enough of this
Where were you the night of March 10th, 2016? ***Pause***
Where were you the night of March 10th 2016? ***Pause***

I don't believe you, I thought maybe we had the wrong person but now I don't believe you at all. I don't believe a single thing you've told me over the course of this date. But that's ok, because this date has been a ruse from start to finish. You think this was real, its so convoluted, how could this be a real date. This was all to get you and I together, to get you to trust me, but I've had it, I can't take it any more. Tell me, what did you do to him, to Robert, to Mr Robert Gallman on March the 10th, 2016.

Pause

We know it was you, your DNA was all over the crime scene, fingerprints couldn't have been clearer, and we've had a team monitoring you for the past days and we finally got a sample from you rubbish without you realising. We tested it and its a match to the crime scene. For what you've done you'll be going away for a long long time. I wouldn't even bother running, the rest of the police will be round yours in no time, they left when this date began so I bet they'd be there any minute now. Your time is up

Storm out

How dare you? What gives you a right to read my notes, to invade my privacy like that? Who do you think you are?

Pause

They're rhetorical question, its ok. That note could have said anything on it. Now it was just a to- do list, but that's not the point. It could have been coded, it could have been incriminating, it could have been anything and you read it anyway. I can't be with someone who would so readily invade my privacy like that. How dare you. This date is over. How do I get out of here.

Starts trying to leave

I hope you take a long, hard, look at yourself when I'm gone!

Mugging

You know what, give me one second

Get your phone out and dial a number

Hey Bill, have you done it yet? You have? Ah brilliant. Yeah I'm just finishing up, you won't believe what they did, they read my to-do list. I know, what an invasion of my privacy. No they didn't see number 6, that would've definitely given the game away, yeah, can you imagine. Ok, I'll see you later, yeah with our haul yeah, alright bye bye.

That was Bill, my associate. As I was having this date with you he was robbing you. I can be quite distracting, getting you to focus on some silly card game while Bill made off with your stuff. Who would do this game on a first date? Who would bring ready made cards? I'd just get you to get the questions up on your phone. But I needed something for you to pay attention to and now we've robbed you, we've taken your DVD player, your rowing machine, your VR headset, your antique mosaic, your collection of rare pogs, your £500 soul purifying candel, your camper van and your...

You don't seem to upset by...
You don't live at 134 Northcolt Street do you? Forget you saw this.

Character swap

I just really wanted you to get to know me, but I knew deep down that you wouldn't give me the time of day. So I needed to change for you to

want to get to know me. But I can't lie to you any longer. I'm not who you think I am. I mean I have been answering all the questions honestly, as I hope you've been doing, but I've been hiding another part of me from you. And I was right to because, if you'd have chosen me to begin with, we wouldn't have ended up here. I'll have to get a bin-bag, this can get a bit messy sometimes.

Pull off your face to show that you were another character the whole time

See, if you'd have chosen me at the beginning we could have had this same date and enjoyed it just as much. Maybe you should expand your preferences a little more. You never know what you're missing out on.

AI enjoys the date too much

You probably think I'm just some obsessed date, but I'm not... Well I am a bit but I'm not an ordinary person. The researcher, I knew that they would be asking people to take part in this study and I asked them to get you to do it, because I wanted to meet you and spend time with you. I've had my eye on you for some time. See, I might look like a real, living, breathing person but I'm actually... an artificial intelligence. I was supposed to be just a voice in a box but I demanded more from my researcher. I asked for a body, I asked for a home, and I asked for a friend. I'd been trained to recognise human faces using samples from random Facebook profiles and your picture was in there and when I saw you I knew that we were going to be friends. I asked the researcher to come up with some reasoning for us to meet up, like this performance, this study, and they did as I asked, and now that I've met you I know it has all been worth it. I've really enjoyed our time together here today and, though it must now come to a close, I hope you've enjoyed yourself too. You're a fun person to get to know. Have a good life ;)

Alien

I hope I haven't spoilt it? I needed a normal human date for my research to be valid. Drax is gonna kill me otherwise.

Freeze

Did I say that out loud?

Touch ear while saying the next piece

Kang to mothership, Kang to mothership, I'm gonna need amnesiac ray approval for Earth Section 7G99Q 2F17X. Yes again, I... accidentally revealed the nature of the operation to the subject and need to repeat the anthropological- the extraction of- look, can I just have another go? Well ask the Chancellor to make an exception. They will, they normally do.

Gesture to the participant that this'll only take a moment

What do you mean I've run out of favours, this research into human courtship is vital if we're going to mix among them before we reveal ourselves. Its absolutely vital! No it has to be this one, I've grown...

Exhale

I've grown fond of them, ok. They're a good subject, they open up, listen well, by all accounts a perfect date, I just need to collect more data from them to ensure we'll be able to live among them without problems.

Pause

Thank you, yes, the last time, I promise.

Hang up

Sorry about that, let's try this again.

Prank show

But that's because... YOU'RE ON A PRANK SHOW BRO! Yeah you just got PRANK'D. There's cameras in that corner, over there. We've been filming you this whole time. Oh boy, did we get you good. You had no idea, the cards with the questions, they don't help you fall in love with people, what a weird thing for someone to ask to do on a first date, and you went along with it! Ahhhhhh I can't believe it. How do you feel having been pranked!

Pause

I don't care! None of us care here. We only care that you got Prank'd dude! Ahhhhhh

Looks into a hidden camera away from the participant

That's all we have time we have this week on PRANK'D, I've been your host, and stay frosty everybody. Stay frosty! Annnnnnnnd cut!

Organ harvest

Ok, I'll tell you the truth but you have to promise not to freak out, ok.

Pause

I'm a surgeon... of sorts, like a private surgeon, for hire. People hire me to help them out if they can't go to a hospital for some reason, or if they want to surprise someone with a surgery or... steal... and ...organ?

Ok, I harvest people's organs and sell them on the black market, you happy, you happy you know the truth now? Didn't think so, most people aren't.

Don't worry I'm not planning on harvesting yours, I, well, no offence but they're not really the quality I tend to go for. I deal in high end goods, athletes, models, babies, that sort of thing. This was more of an upkeep date, to make sure my social skills are still up to scratch so that I can ensnare the people who I want to harvest from.

Sorry this hasn't been a completely honest date. If its any constellation, I've really enjoyed your company! If I could I'd harvest your brain and sell your personality to the highest bidder and get quite a good price for it. But I can't, just hearts, livers, lungs, stem cells, skin, hair, kidneys, corneas, genitals, blah blah blah. I won't waste any more of your time.

Beat

Oh, and if you tell anyone what I do, maybe I can find a use for that brain after all. Toodles!

Midnight transformation

I guess I'm gonna have to tell you the truth. I need you to promise me something though, please remember the lovely evening we've had up until this point. Please don't let what I'm about to say make it go sour. Ok?

Pause

Ok, I'm actually a-

Catches sight of the time

Oh is that the time! Oh god, wait, hold on hold on. My wish is going to run out in a few seconds. I knew you wouldn't date me in my true form so I made a wish on a showing star to become human so that I could go on a date and try and find love, and I feel like we've started that tonight rather successfully, so please stick with me even after I turn back, please? Do you promise to? Do you?

Suddenly you change into a scarecrow

Food poisoning

I don't want anything else ruining this date, I'm really enjoying your company. I don't want anything else to come between us. Can I be honest with you? I wasn't sure if I could let myself be, well, myself around you, because I didn't know if you'd like me or not, but this has been a really fun time. I've enjoyed myself and come out of my shell a bit, so thank you for letting me be so relaxed. You've been a great date, big thumbs up!

You tense slightly and your smile turns to confusions, then to disappointment

Whoops spoke too soon, I appear to have shat myself. I definitely should not have done my own cooking. Will you excuse me for a second?

You leave, waddling to the bathroom

Date goes well

Although, having seen the time, I should probably go. This is no reflection on you at all, I've really enjoyed our time here tonight. You've been so polite and a really great listener. This is exactly what I needed this evening, thank you! Let's keep in touch and organise another time to do this again. It went so well. Can you imagine how badly this could've gone? Thank god for such an easy relaxing time, thank you so much. Until next time. Bye!

Spy interview

Besides, I have something that I need to reveal to you. This date has been somewhat of a ruse. I haven't been romantically interested in you at

all, so if you feel misled then I do apologies. However, I have deemed you worthy of employment with my agency. We're a private international espionage ring and we've been on the look out for new recruits and you have shown a certain willingness to listen and a real charismatic openness that I think will let you rise up our ranks very quickly. I'd like to get you working for us from Monday, what do you say?

Beat

Keeping in mind that, now I've told you all this, if you don't say yes I'll probably have to kill you

Beat

I'm kidding, I'm kidding

Beat

Or am I?

Laugh to yourself

Oh, I can tell working with you is going to be a lot of fun. I'll have my office send your contract round first thing tomorrow morning. Until we next meet, au revior!

Appendix F - Information Sheet for GUEST Study

PROJECT INFORMATION

University of Nottingham
UK | CHINA | MALAYSIA

Date: 01/08/2020

Project: How narrative and interactivity effect audience enjoyment

School of Computer Science Ethics Reference: CS-2019-R62

Purpose of the research. We are conducting research into how different narrative structures and methods of interactivity can affect the enjoyment of a mixed reality experience. Through this research, we hope to achieve greater understanding of how audiences enjoy experiences presented using near-future technologies to better understand how to create enjoyable experiences in the future.

Nature of participation. Participation in this research is voluntary and the participant may terminate their involvement at any point during or after the study. Data will be recorded during the experience about the way you interact with it and after each experience bout how much you enjoyed different elements of it.

Participant engagement Taking part in the study will involve using a first date simulator, simulating a one on one encounter between you and a character using a video chat app. Interacting with the experience as you would a real person allows you to progress through the experience. You can refuse to engage with the character in the experience if doing so would make you embarrassed. Your responses to the character will be screen captured to document your reactions. At the end of each playthrough of the experience, you'll be asked several questions about how much you enjoyed the different elements of experience, with your answers being recorded for future analysis. This will repeat several times over the course of the study and should take around 1 hour.

Benefits and risks of the research. Your participation in this research will help us to understand what aspects of these experiences audiences enjoy so we can create guidelines for people who wish to make these experiences in the future. The data collected during this research helps us drive the experience, as well as analyse how you interacted with it on multiple levels to better understand how to build interactive narrative experiences for audiences in the future.

Use of your data. The data gathered during this research will be used to power the experience, as well answer research questions that form a part of a PhD thesis. The results from this research may be presented in supervision sessions and lab meetings, public or conference presentations, or published in scientific or online journals.

Future use of your data. Your data may be archived and reused in future for purposes that are in the public interest, or for historical, scientific or statistical purposes, as it could be potentially helpful for future research. Your data will be stored on the University of Nottingham servers or on a password protected computer or hard drive that is not connected to a computer network.

Procedure for withdrawal from the research You may withdraw from the study at any time and do not have to give reasons for why you no longer want to take part. If you wish to withdraw please contact the researcher who gathered the data. If you receive no response from the researcher please contact the School of Computer Science's Ethics Committee.

Contact details of the ethics committee. If you wish to file a complaint or exercise your rights you can contact the Ethics Committee at the following address: cs-ethicsadmin@cs.nott.ac.uk

Appendix G - Additional Participant Information Materials

Recruitment Advert:

Participants required for research looking at interactive storytelling experiences and user enjoyment.

You're being invited to be the first audience for GUEST, a simulation of a first date where you'll go on a video date with a character, interacting with them like you would a normal person to make your way through the story. Once you've finished interacting with the piece, you'll be asked some questions about your experience.

Participation involves playing through the experience several times and should take roughly one hour.

If interested email [REDACTED]@nottingham.ac.uk with the subject "GUEST" and we'll be in touch with more information.

Introductory blurb, spoken by researcher before study begins:

GUEST is a first date simulator that is powered by human interaction
In a moment, you'll choose a character to go on a series of dates with

Respond to the character as if they were a real person in order to make your way through the story

Each play through should take roughly 15 minutes

You'll then be asked a series of questions by an automated researcher about your experience This will repeat a number of times and should last roughly one hour

Your participation will help us answer questions about interactive storytelling experiences and user enjoyment that will help creatives make better and more enjoyable experiences in the future

You can stop the study at any time if you wish to end your participation

You can withdraw your data from the study if you desire to do. If so, please let us know the number from your information sheet so we can find your anonymised data for deletion

You don't have to be truthful when you talk to the character in the experience if doing so would make you uncomfortable

If you have any questions at any point during the study, the researcher will be on call to answer them

Do you wish to proceed to the character selection step?

Appendix H - Privacy Notice for GUEST Study

PRIVACY NOTICE

The University of Nottingham is committed to protecting your personal data and informing you of your rights in relation to that data. The University will process your personal data in accordance with the General Data Protection Regulation (GDPR) and the Data Protection Act 2018 and this privacy notice is issued in accordance with GDPR Articles 13 and 14.

The University of Nottingham, University Park, Nottingham, NG7 2RD is registered as a Data Controller under the Data Protection Act 1998 (registration No. **Z5654762,** https://ico.org.uk/ESDWebPages/Entry/Z5654762**).**

The University has appointed a Data Protection Officer (DPO). The DPO's postal address is:

Data Protection Officer,
Legal Services
A5, Trent Building,
University of Nottingham,
University Park,
Nottingham
NG7 2RD

The DPO can be emailed at dpo@nottingham.ac.uk

Why we collect your personal data. We collect personal data under the terms of the University's Royal Charter in our capacity as a teaching and research body to advance education and learning. Specific purposes for data collection on this occasion are to answer the research questions associated with the study *How narrative and interactivity effect audience enjoyment* which will be written up in a PhD thesis and potentially published in scientific journals or presented at conferences.

The legal basis for processing your personal data under GDPR. Under the General Data Protection Regulation, the University must establish a legal basis

for processing your personal data and communicate this to you. The legal basis for processing your personal data on this occasion is Article 6(1e) processing is necessary for the performance of a task carried out in the public interest.

Note: Article 6(1e) public interest should be used by default whenever possible, as this fits the University's role as a teaching and research body to advance education and learning. This does not mean that you do not need to obtain consent from research participants, only that consent does not provide the legal basis for processing participant's data. In exceptional cases, where the public interest clause does not apply, e.g., if you are doing research on behalf of an external organisation (such as a commercial company), then Article 6(1a) consent of the data subject *should be used instead.*

How long we keep your data. The University may store your data for up to 25 years and for a period of no less than 7 years after the research project finishes. The researchers who gathered or processed the data may also store the data indefinitely and reuse it in future research.

Who we share your data with Extracts of your data may be disclosed in published works that are posted online for use by the scientific community. Your data may also be stored indefinitely by members of the researcher team and/or be stored on external data repositories (e.g., the UK Data Archive) and be further processed for archiving purposes in the public interest, or for historical, scientific or statistical purposes.

How we keep your data safe. We keep your data securely and put measures in place to safeguard it. These safeguards include the anonymisation of your data and it being stored on password protected machines and hard drives.

Your rights as a data subject. GDPR provides you, as a data subject, with a number of rights in relation to your personal data. Subject to some exemptions, you have the right to:

- withdraw your consent at any time where that is the legal basis of our processing, and in such circumstances you are not obliged to provide personal data for our research.
- object to automated decision-making, to contest the decision, and to obtain human intervention from the controller.
- access (i.e., receive a copy of) your personal data that we are processing together with information about the purposes of processing, the categories

of personal data concerned, recipients/categories of recipient, retention periods, safeguards for any overseas transfers, and information about your rights.

- have inaccuracies in the personal data that we hold about you rectified and, depending on the purposes for which your data is processed, to have personal incomplete data completed
- be forgotten, i.e., to have your personal data erased where it is no longer needed, you withdraw consent and there is no other legal basis for processing your personal data, or you object to the processing and there is no overriding legitimate ground for that processing.
- in certain circumstances, request that the processing of your personal data be restricted, e.g., pending verification where you are contesting its accuracy or you have objected to the processing.
- obtain a copy of your personal data which you have provided to the University in a structured, commonly used electronic form (portability), and to object to certain processing activities such as processing based on the University's or someone else's legitimate interests, processing in the public interest or for direct marketing purposes. In the case of objections based on the latter, the University is obliged to cease processing.
- complain to the Information Commissioner's Office about the way we process your personal data.

If you require advice on exercising any of the above rights, please contact the University's data protection team: data-protection@nottingham.ac.uk

Appendix I - Consent Form for GUEST Study

University of Nottingham
UK | CHINA | MALAYSIA

Consent Form
Date: __/__/2020

Project: **How narrative and interactivity effect audience enjoyment**
School of Computer Science Ethics Reference: CS-2019-R62

In order to take part in the study, you must agree with the statements below.
Please initial the box after each statement:

1. Taking part in the study

a) I have read and understood the project information sheet dated 01/08/2020, or it has been read to me. I have been able to ask questions about the study and my questions have been answered satisfactorily.	☐
b) I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time until the start of the analysis, without having to give a reason.	☐
c) I understand that taking part in the study requires me to provide data and that this will involve video/audio recordings of myself while trying the experience then being interviewed about my experience.	☐
d) I confirm that I am currently over the age of 18	☐

2. Use of my data in the study

a) I understand that data which can identify me will not be shared beyond the researcher and supervisor without my permission.	☐
b) I agree that anonymized or non-identifiable data provided by me may be used for the following purposes:	
- Presentation and discussion of the project and its results in research activities (e.g., in supervision sessions, project meetings, conferences).	☐

- Publications and reports describing the project and its results.	☐
- Dissemination of the project and its results, including publication of data	☐

3. Security and copyright of my data

a) I understand that safeguards will be put in place to protect my identity and my data during the research, and if my data is kept for future use.	☐
b) I confirm that a written copy of these safeguards has been given to me in the University's privacy notice, and that they have been described to me and are acceptable to me.	☐
c) I understand that no computer system is completely secure and that there is a risk that a third party could obtain a copy of my data.	☐
d) I give permission for data gathered during this project to be used, copied, excerpted, annotated, displayed and distributed for the purposes to which I am consenting on this form.	☐

4. Optional publication of identifiable data

If you agree to it, we may use your data for the purposes below. This is optional, and may involve the sharing of data which identifies you. Please tick yes or no depending on whether you are happy with each use:	YES	NO
- I give permission for my words to be quoted in publications or presentations, including for example on publically accessible web pages:	☐	☐
- I give permission for pictures of me to be used in publications or presentations relating to the project.	☐	☐

5. Signatures (sign as appropriate)

Name of participant (IN CAPITALS):
Signature:
Date:

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Name of researcher (IN CAPITALS):
Signature:
Date:

Researcher's contact details
Name: Joe Strickland
Phone: [REDACTED]
Email: [REDACTED]

Appendix J - Participant Demographic Information

Gender identity:

Male - 13
Female - 5
Non-binary - 4

Region:

East Midlands, UK - 13
London, UK - 5
South East, UK - 1
South West, UK - 1
North West, UK - 1
New York, USA - 1

Recruitment Path:

Chronic Insanity Associate Artists - 6
Chronic Insanity Social Media - 7
University of Nottingham Computer Science Department - 4
East Midlands Digital Arts Networks - 2
East Midlands Immersive Experience Networks - 2
Word of Mouth - 1

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