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**Possessed by the game: Flow State and Embodied Presence
within a Virtual Reality Game.**

Drew Davies

21150198

Bachelor of Design, Auckland University of Technology (2024).
This thesis is submitted to Auckland University of Technology in partial fulfilment of
the degree of Master of Design.

2026

Abstract

This research explores how Virtual Reality (VR) games can prolong and enhance a player's flow state by fostering embodied presence. Following a practice-led design process using theorists such as Csíkszentmihályi's (1990) theory of flow and existing research on presence and embodiment in VR, this study explores how mechanics, such as controls, eye-tracking, and gameplay, can be deliberately designed to deepen player engagement in a VR horror game. This project follows an iterative design methodology, cycling through conceptualisation, prototyping, and evaluation to refine ideas and ultimately design an immersive game which tests ways to sustain player flow. Central to this process is the integration of VR techniques - like eye-tracking for gaze-based interactions and bodily engagement- to invite natural perception and interaction within the virtual environment. This practice-led project offers insights into designing flow state in VR games. Findings include that gradual challenge progression, embedded narrative and UI systems, and interactions and controls focused on creating embodiment can support sustained attention and flow within VR. Eye- and hand-tracking increase a sense of presence but have limitations in reliability and precision.

Keywords: Virtual Reality, Flow State, Embodiment, Presence, Eye Tracking.

Acknowledgements

I would like to thank my supervisors, James Smith and Masaya Todoroki, for their constant guidance and feedback throughout this project. Their support helped shape my research and project into what it is today. Their encouragement pushed me to complete this thesis and be proud of what I have achieved. I could not be more grateful. Thank you so much.

I also want to thank the Auckland University of Technology, the School of Art and Design, for providing me with the opportunity to conduct this research and for the support through the Research Design Scholarship, which allowed me to focus on my studies.

Thank you to my friends and fellow master's students, who I can now call my friends. Their encouragement helped me feel supported and loved throughout this project. I would also like to thank Jade Parkin, my right-hand woman, for helping me manage my stress and guiding me through my writing.

I would like to thank my family for their patience, support, and encouragement throughout my

studies, and for all the energy drinks they brought me during crunch time; it means a lot. Lastly, a special thanks to my sister Amy Davies. Her support with my writing means the most. Thank you.

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Glossary of Terms

VR - Virtual Reality

HMD - Head-Mounted Display

NPC – Non-Playable Character

UI – User Interface

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly mentioned), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Drew Davies 2026

Signed:

Chapter One: Introduction

1.1 Introduction

This project explores how to enhance flow state in Virtual Reality (VR) game experiences by creating a VR horror game. The study emphasises the design of embodied interactions, such as eye and hand tracking, embedded environmental storytelling techniques, and a gradual increase in challenge relative to skill. The research question asks:

“How can a Virtual Reality (VR) game be designed to aid in sustaining and supporting flow state, through the design of embodied mechanics, gameplay pacing through challenges, and embedded narrative design to heighten embodied presence?”

Although VR is seen as an immersive media form with vast potential for creating flow state for players (Bian et al., 2023; Dastugue, Gollety, & Pez, 2023), there is a lack of a clear definition around what flow state looks like within VR gaming, and the phenomenon is still often conceptualised around flat screen affordances despite VR having different perceptual possibilities (Dastugue, Gollety and Pez, 2023). The goal of this research is to demonstrate how VR games can be designed to enhance flow state by creating a working proof-of-concept game prototype as an initial proposition.

My research positioning has been shaped by my fascination with escapism through narrative-driven experiences. I have always been drawn to media that use emotional connections and immersive world-building to create engagement, as they allow the audience to forget daily life and, for a moment, become part of another world. My previous video game creations explored this relationship, particularly through narrative techniques that encourage players to form connections with the character and the gameplay, fostering deeper engagement (Jenkins, 2004). For example, one of my games, *Syndicate*, explores the story of a young boy abandoned by his parents, experimented on inside an orphanage by the people meant to care for him. I used embedded narrative techniques and environmental clues to engage the player through exploration of the game world, building a connection between the player's and the characters' stories. These emotional connections create a deeper sense of engagement, capturing their attention as they work to keep this character alive. As I grow as a developer, I am curious about how I can push this connection further through environmental storytelling to develop a sense of embodiment in immersive media such as VR, creating experiences where the player is engrossed in the character's story, forgetting the mechanics and focusing on the tasks at hand and becoming fully encompassed in the game's narrative.

This type of engagement aligns with Csíkszentmihályi's (1990) original theories of the 'flow state,' which is commonly understood as a psychological experience in which someone engaged in a task or activity is fully immersed in a sense of focus and enjoyment. This analysis of flow state has been valued in game design as a framework for shaping game development to enhance player experience (Chen & Yuan, 2025). Flow state is an important goal for game designers to strive for in their players because, as Smith (2021) argues, flow can serve as a motivator, keeping players engaged and wanting to interact with the scene for longer, resulting in deeper immersion and a positive experience (Smith, 2021, p.14). Maintaining a sense of flow is an important goal for game designers, as sustained engagement strengthens overall player enjoyment and investment in the game (Rashed et al., 2025).

Before VR, video games positioned players as external observers looking at the screen. With the development of VR experiences, which bring users directly into 360-degree virtual spaces, players can be immersed in the virtual world, interacting with it from a first-person perspective. VR specifically creates a "synthetic world" that "mimics the properties of real-world environments and allows user immersion" through a Head Mounted Display (HMD) (Kasapakis, Gavalas, & Dzardanova, 2018, p. 1).

VR offers a new form of play, allowing players to experience the game through characters' bodies, fostering a deeper sense of embodiment (Chen & Yuan, 2025). Researchers such as Bian et al. (2023) suggest that these affordances could heighten the flow state. Dastugue, Gollety and Pez (2023) studied the shift from traditional video game flow state to how it is developed for VR and state: "VR flow state (Virtual Reality) suffers from a conceptualisation deficit" noting that there is a lack of clear definition around flow state within VR "from a perceptual angle (self-perception, temporal perception, situational perception, sensory perception) and confirm the singularity of the optimal experience under a VR device" (Dastugue, Gollety and Pez, 2023, p.42). Dastugue, Gollety, and Pez argue that VR is often explored alongside flat-screen video games, but it offers distinct capabilities for creating an optimal experience by shaping players' perception. The aim of this research is to address this context by creating a working game prototype that utilises VR's unique capabilities to foster flow.

This study responds to these calls for conceptualising flow within VR games and adopts a practice-led research paradigm, in which knowledge is created through the iterative design and development of a VR prototype (Skains, 2024, p. 11). In addition to being a practice-led project, I have incorporated elements of iterative design methodologies (Macklin & Sharp, 2016) to develop the final proof of concept. This research will begin with critical reviews of other practitioners' work

and the literature on game design, embodiment, and the flow state, laying the foundation for the study. This will then be followed by the iterative design and development of a short VR game demonstration, using cycles of conceptualising, prototyping and evaluating to create the project's design decisions. Lastly, the project concludes by reflecting on the game's outcome and findings from the process.

1.2 Significance of the Research

The significance of this research lies in expanding on how players can interact with VR by designing specifically for flow state through embodied interactions. This project explores techniques like hand-tracking to enable natural-feeling interactions with objects, eye-tracking as a gameplay mechanic, and objects and environmental details throughout the space for exploration. Finally, the balance challenges gradually increase in intensity, allowing the player to learn through exploration without becoming frustrated. Together, these mechanics attract the player's attention naturally without the need for traditional interfaces.

Chapter Two: Literature Review

2.1 Flow State and Presence

“Flow is a subjective [user experience], and the most obvious sign of flow is the integration of action and consciousness” (Dong Yu et al., 2022, p.1)

Flow theory, developed by psychologist Mihály Csíkszentmihályi (1990), defines a state of flow as when “thoughts, intentions, feelings and the senses are focused on the same goal” (Csíkszentmihályi, 1990, p. 3), creating a deep focus and engagement. This state arises when challenge is balanced with the individual’s skill, when the person is presented with clear, achievable goals, and with immediate feedback that provides positive reinforcement, creating a sense of “optimal experience” (Csíkszentmihályi, 1990). When the task becomes overloaded with “demands, options, [and] challenges”, a person can become anxious and overwhelmed, disrupting focus, and if there is not enough stimulation, “we get bored” (Csíkszentmihályi, 1990, p.7) (Figure 1). Csíkszentmihályi highlights the state of flow through activities like “sports, dance ... the martial arts [and] music,” contending that a person can “find delight in what the body can do” through bodily engagement.



Figure 1

Mihaly Csíkszentmihályi's model of flow is related to challenge and skill.

Note. Reprinted from *Flow: The Psychology of Optimal Experience* (p. 74), by Mihaly Csíkszentmihályi, 1990, Harper & Row. Copyright 1990 by Harper & Row.

Within video games, flow is considered a combination of factors that work together to create a positive user experience. Dong Yu et al. (2022, p.1) describes flow as a “balance between the level of skill and the challenges of the task, clear goals, ... immediate feedback ..., merging of action and awareness, high concentration, a sense of control over the activity, a loss of self awareness, a loss of the sense of time” and when these conditions are integrated seamlessly into the core gameplay they optimise flow and create a sense of immersion.

Games with a challenge require more motor skills and strategising to complete the task, making the experience feel more rewarding. However, Csíkszentmihályi (1990) argues that poorly communicated rules and strenuous challenges quickly break the flow state, leading to aversion and disconnection, and ultimately to anxiety or boredom. In the context of this project, these challenges need to be “easy to learn but difficult to master”, making the game tasks easy to

understand and pick up, resulting in the player getting involved with the game faster, but having enough challenge that players with more skill can also be challenged within the gameplay (Rutrecht et al., 2021, p.359).

In VR games, presence and embodiment can influence the level of flow state the player experiences as they connect to the virtual environment through their virtual body (Bian et al., 2023). While flow is achievable within all types of gaming media, VR heightens the experience by introducing a sense of presence. Presence is the aim to create a virtual world that 'mimics' the real world, matching the player's movement. (Dionísio et al., 2018, p.34). VR creates this "sense of being in the virtual world" (Bian et al., 2023, p. 3) by surrounding the player inside the virtual environment.

VR offers full-body interactions, as your movements are tracked by cameras on the headset. Using your whole body to participate in a game creates a deeper sense of involvement, as you are no longer just pressing buttons on an external controller.

Design implications to consider when attempting to create full-body tracking in VR include poor interface integration, delayed feedback, and visual distortion, which can disrupt the player's flow state. "When a visual scene moves independently of how a user is physically moving, there can be a mismatch between what is seen and what is physically felt" (Jerald, 2015, p.164). As a result, flow in VR is delicate; maintaining it means reducing sensory or visual distractions, which must be considered in the context of my project, as such distractions can disrupt players' engagement. When done correctly, the blend of flow state and presence can form an overall sense of embodiment.

2.2 Embodiment Through Hand and Eye Tracking

Embodiment within VR "refers to the sensations of being inside, having, and controlling a body" (Guy et al., 2023, p.1). Embodiment operates as a "sense of body ownership, agency, and self-location, respectively" (Zhang et al., 2023, p.2) to involve the player within the virtual environment to create a sense of presence existing in a non-existent world (Bian et al., 2023, p.1151).

Digital avatars are believed to create a sense of embodiment by mirroring the user's physical movements in real time. Zhang et al. (2023) note that digital avatars in VR "can deceive the user's brain, and the sense of embodiment can make users believe that the virtual bodies are

their own bodies" (Zhang et al., 2023, p.2).

The flow-state theory of control is explored through the player's interactions within the scene - the more a player is in control of their actions, the higher the level of agency. Player agency is defined as "the feeling of being the cause of our actions" (Guy et al., 2023, p.2). It is the sense of body ownership that makes every move you make in the virtual world feel like your own choice. This can further the sense of embodiment, as "[n]ot only does one transform the environment with their action, but also experience how one changed it" (Guy et al., 2023, p. 3), with their character mimicking every move they make. In response, this project will test how the players' controls and movements within the virtual space can sustain flow by increasing agency and simplifying controls to reduce the players' awareness of the interface.

Hand-tracking also promotes embodiment. VR hand tracking - whereby players' hands are detected and tracked by cameras on VR headsets and placed into virtual worlds as naturalistic controllers in real time - provides a "unique and natural way for users to interact with virtual environments" (Lee, 2024, p. 19). This makes the virtual world feel more like the real world and allows the player to interact with it in similar ways. When a player's hands move synchronously with their virtual hands, it can create a sense of agency, altering the player's perception so they feel as though they are directly controlling the virtual body (Zhang et al., 2023, p. 10). Hand tracking can benefit flow by being easy to remember and use (Lee, 2024, p. 19) and by allowing the player to focus on the task at hand rather than the buttons on a controller, enabling them to be present in the scene more quickly.

Voigt-Antons et al. (2020) studied interaction methods (hand tracking versus controllers) across various task types in a virtual world. They concluded that although neither interaction method "did not influence the experience of presence and realism", players preferred hand tracking for tasks involving grabbing because it was more natural and created less arousal, as the interactions required less demand (Voigt-Antons et al., 2020, p. 3). The disadvantages of hand controls can be that it "leads to a lower feeling of control/precision ... this effect could be due to the fact that users are still more used to controller interaction" (Voigt-Antons et al., 2020, p.3), therefore making it easier to control.

2.3 Embedded Narrative Design

Embedded narrative is defined in this research as a predetermined story or plot structure which a player uncovers as they explore and navigate a virtual world (Amiri, 2019, p. 1, 3; Jenkins, 2004). Embedded narrative conveys its information through environmental storytelling, by using"

meaningful objects and encounters within the game space” (Koenitz, 2024, p.8). This information can come from conversations with non-playable characters, artefacts such as books and letters hidden throughout the scene, and/or audio cues.

In the context of this research, embedded narrative is useful because it integrates storytelling into the environment, allowing the player to uncover the story as they play. According to Jenkins (2004, p.6), “environmental storytelling creates the preconditions for an immersive narrative”. Jenkins describes the space as a staging ground for narrative events, highlighting how players derive greater meaning from their involvement rather than from passive viewing.

Similarly, Bracikowska (2020, p. 167) noted how narrative emerges through movement within the design, as “the player reconstructs the story by interpreting different objects, scenes, and events embedded in the game environment.” Embedded narrative supports engagement as players discover the story through play and exploration, encouraging them to lose themselves within their environment (Koenitz, 2024).

This develops a sense of player agency as the player “effect[s] meaningful changes in a game world” (Bateman, 2021, p. 66). This allows the player to feel a sense of agency in their virtual world, highlighting how the game narrative is unearthed by players' actions. This is relevant to embedded narrative design, where the story's progression is set but is discovered by the player and told through interaction with the space around them. This project tests this sense of agency, as physical actions such as grabbing objects, examining details and documents, or moving directly reveal new narrative clues as the player works out what has happened in the storyline, strengthening their sense of embodiment and involvement in the world.

Embedded narrative can support the development of flow state by capturing players' attention as they search for environmental clues and figure out events for themselves, rather than through surface-level gameplay. Flow state, according to Smith (2021, p.13), is also closely tied to motivation. Therefore, allowing players to discover information at their own pace creates meaning in the narrative as they actively seek it out. Allowing “the player to invest more time and effort into the game, which could lead him/her to move into deeper stages of immersion” (Smith, 2021, p.14).

2.4 Gameplay + Attention Challenges

Mihály Csíkszentmihályi (1990) identifies the balance between challenge and skill as a core component of flow, highlighting that when a task's difficulty is appropriately matched to the individual's ability, optimal engagement can be achieved. Lemmens & Münchhausen (2023, p. 1) tested this theory in a VR game, discovering that “the match between skill and difficulty led to higher levels of flow,” and that excessive difficulty decreased a player's flow state due to frustration. Conversely, Lemmens & Münchhausen (2023) found that when a game was too easy, the effects on flow state were less detrimental, as players maintained some enjoyment of the gameplay even without challenge. These findings highlight the importance of pacing within a game's challenge. Overwhelming the player with activity breaks their flow state, whereas if the game begins at a slower pace, allowing the player to adjust to the controls, and gradually increasing the challenge, it sustains the player's engagement across a wider range of skill levels.

Once the player understands the controls, the challenge's conditions must shift. Boredom can create a break in flow - good games need to situate themselves as “[e]asy to learn but difficult to master” as it's important for a game to be easy to learn so newer players will be able to understand the controls, but provide depth to its mechanics so capable players can challenge themselves and remain in flow state (Rutrecht et al., 2021, p.359). When aligned with Dastugue, Gollety, and Pez's (2023) theories of the flow state, fast-paced mechanics increase engagement by creating a challenge that keeps the brain focused through immediate feedback and minimal distractions, allowing the player to learn through gameplay and remain engaged throughout the challenge. From this perspective, creating this urgency does not always produce negative anxiety; it simulates the brain, prolonging the state of flow through rapid learning and concentration.

A game that highlights the balance between challenge and usability is the survival horror game, *Five Nights at Freddy's* (Scott Cawthon, 2014). As the game begins, the player is given the basic rules verbally at the start via a phone call: “[the animatronics] do tend to wander a bit at night... check those cameras and remember to close those doors only if absolutely necessary, got to conserve power”. (Figure 2) These quick explanations of verbal rules give the player the basic tools to complete the game, whilst also creating a challenge as they are thrown into the night, having to learn through gameplay to develop strategies to survive. Similar to Rutrecht et al. (2021) and Dastugue, Gollety and Pez's (2023) theories behind flow state to create a game that challenges the player, *Five Nights at Freddy's* gameplay pacing allows for these rules to be brief as the game starts slow, allowing the player to get a feel for the space and mechanics, and as the night goes on, it gradually increases intensity changing pace. This prolongs their time in the flow state by helping them lose track of the outside world, keeping the player focused on the challenges and

leaving no room for hesitation.



Figure 2

Gameplay scenes from Five Nights at Freddy's.

Note. Screenshot from *Five Nights at Freddy's* [Steam store page], by S. Cawthon, 2014, Steam.

https://store.steampowered.com/app/319510/Five_Nights_at_Freddys

2.5 Eye Tracking

Since the integration of eye tracking into newer VR headsets, game designers have been able to track players' gaze in real time. Author Jerald (2015) studies VR design, highlighting the headset's integration of eye-tracking to determine where the player is looking within the scene. So far, eye tracking has primarily been used for game optimisation, such as “foveated rendering” (Caputo et al., 2021, p. 177), which uses focal points to reduce rendering the entire space, saving the game's processing time. Eye tracking possibilities as a core gameplay mechanic remain underexplored” (Jerald, 2015, p. 318). Using eye tracking within gameplay for “specialised tasks and for subtle interactions” (Jerald, 2015, p. 319), such as “how a character responds when being

looked at” and/or reactions to what they look at, can heighten flow by engaging the player's attention (Jerald, 2015, p. 320).

Techniques such as dwell-time selection allow players to select buttons without a controller by focusing on the target button for an extended period (Kopácsi et al., 2025, p. 521). But there is an implication to this as “eye saccades can also make the pointer jitter or jump in unintended ways” (Jerald, 2015, p. 319), which could make it difficult for players to focus on one point accurately. Research suggests dwell-time selection, “show[ed] promising results for fast target selection with low physical effort...For instance, a basic eyes-only approach is dwell time, where users look at the target for a specific time” (Pfeuffer et al., 2020). Although useful for UI navigation and reducing controller distribution, eye tracking remains underexplored as a gameplay control for creating challenge or tension. For example, the game *The Dark Pictures: Switchback VR* (2023) uses eye tracking as a mechanic to track whether the player's eyes are open or closed to create a “do not blink” mechanic where enemies move only when the player closes their eyes (Figure 3), forcing them to face the horrors head-on.



Figure 3

Screenshots of the eye-tracking mechanic shown in The Dark Pictures: Switchback VR.

Note. Screenshot from *The Dark Pictures: SWITCHBACK VR | Full Playthrough* [Video], by

YouTube creator, YouTube, March 2023, https://www.youtube.com/watch?v=FUCq8qY8G_o

Exploring eye tracking as a core gameplay mechanic creates new forms of engagement by incorporating the player's visual attention into a challenge, simulating cognitive effort in unfamiliar ways. The study of attentional synchrony by other practitioners highlights predictable gaze patterns, which game designers can leverage to create environments that disrupt players' visual expectations, controlling where they are allowed to look and turning off their visual safety.

In VR, gaze-based mechanics can complement flow state. Visual attention can become part of the embodied experience when players are encouraged to remain attentive within the space, sustaining immersion through engagement as they take on greater control over their character. Gaze-based mechanics can heighten engagement as players continuously challenge their reflexes, fostering heightened awareness and a sense of constant learning.

Chapter Three: Methods and Methodologies

3.1 Iterative Design

This research adopted a practice-led methodological approach, meaning that the development of this VR game serves to generate new understandings of the practice (Skains, 2024, p.11).

Practice-led research was chosen as this project's conceptual framework and methodology, as it enabled me, as a designer, to develop knowledge through creation using an iterative design approach that involved conceptualising, prototyping, and evaluating (Gordy & Yahaya, 2023, p. 50)(Figure 4). An iterative design approach was used to progressively refine the game. Each iteration tested my prior theoretical readings and theories by creating an embedded storyline and altering the initial designs to support flow.

Iterative design was a beneficial methodology for this project's pipeline because, as Macklin and Sharp (2016) define it, it is an “adaptive process” that allows the designer to "move through cycles of ... an idea" through repeated prototyping, playtesting, evaluation, and refinement. Iterative design is particularly suited for game design, as the outcome is often difficult to predict and constant questions need to be asked, such as 'Do the players understand what they are supposed to be doing? Are they having fun? Do they want to play again?' (Tekinbas & Zimmerman, 2003, p. 1) Without repeated cycles of testing, these questions can be overlooked, as they can only be answered through play.

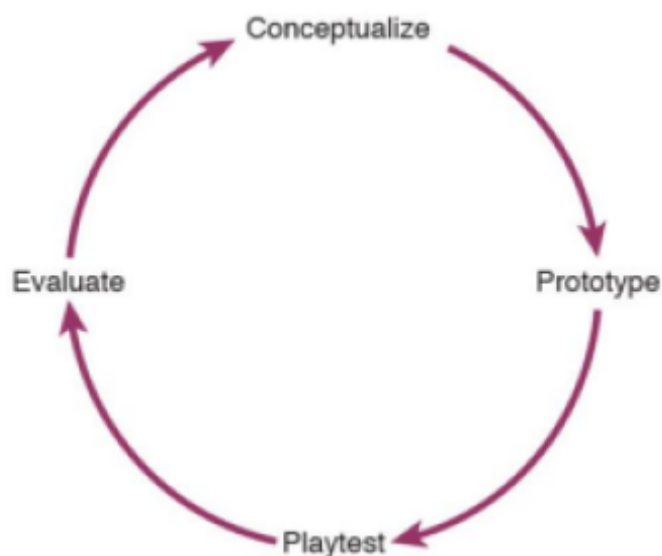


Figure 4

Screenshots of *the iterative prototyping cycle used in game development.*

Note. Adapted from *Games, Design and Play: A Detailed Approach to Iterative Game Design* (p. 106-108), by C. Macklin & J. Sharp, 2016, Addison-Wesley Professional.

Figure 4 is a visualisation of my own adapted iterative cycle of conceptualisation, prototyping, and evaluation (Macklin & Sharp, 2016). The cycle alterations were refined to better align with my individual developer process. Rather than external playtesting, a new method of heuristic self-evaluation was developed from previous literature (Moran & Gordon, 2023), in which each of my prototyping phases was assessed against established criteria for flow and embodiment. As with Macklin and Sharps (2016) model of iterative design, my iterative cycle flowed through phases of conceptualisation, prototyping and evaluation at each stage of the design process. (Figure 5)

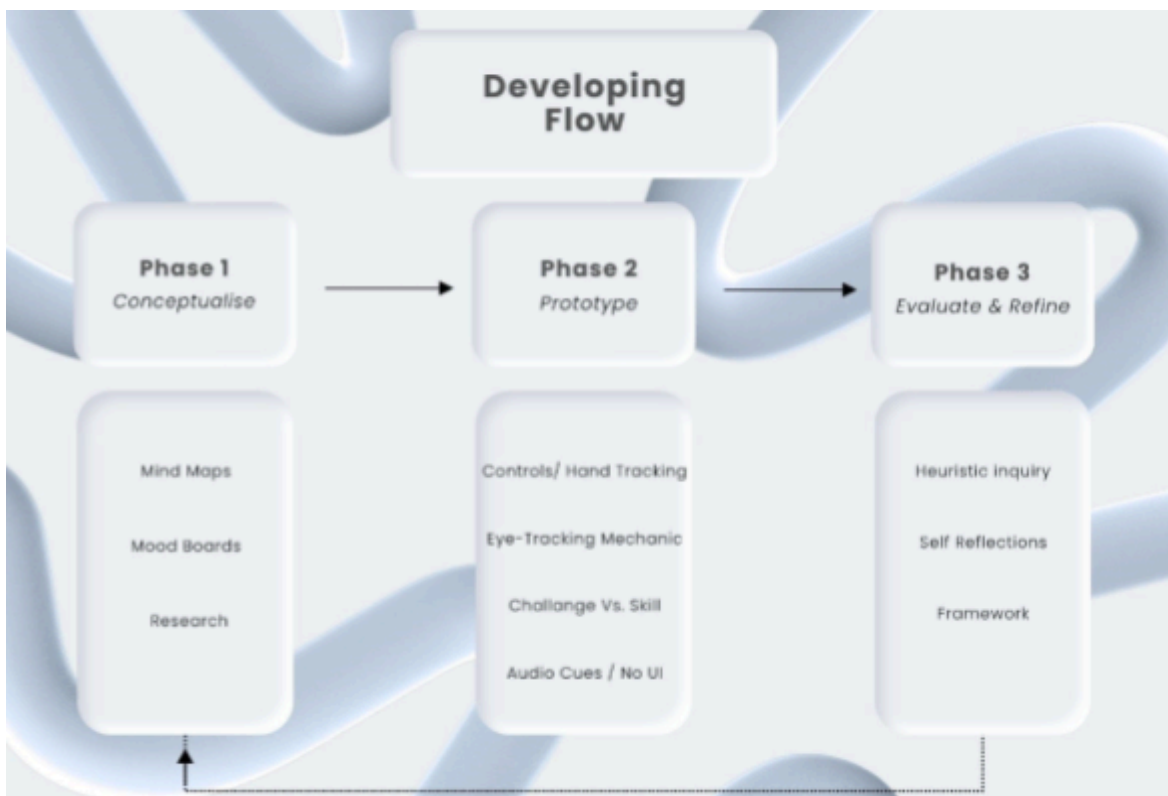


Figure 5

Developing flow: Practice-led design process used in this study.

3.2 Conceptualise

Conceptualisation is the initial idea for a game and its intended play experience (Macklin & Sharp, 2016, p.195). As Macklin and Sharp (2016) argue, "[q]uantity over quality" - beginning with a wide range of ideas through brainstorming or mood boards enables designers to determine the main purpose of their project and what they are trying to achieve.

3.3 Prototype

Once my game's concept was established, prototyping was used to turn the "what ifs" into something tangible. According to Macklin and Sharp (2016, p. 166), prototyping enables designers to explore and refine in-game experiences. Prototyping serves as "a rough approximation of the artwork, sound, and features" (Fullerton, 2014, p. 197), allowing the developer to test core aspects of the game before the finalised product is released.

In this project, prototyping was used to run small, iterative tests of the core mechanics and interactions in the virtual environment, as well as aesthetic details such as environment, character, animation and sound design. Given this project's strong focus on flow theory, prototyping was essential for testing how design decisions influenced the player's experience.

3.4 Evaluation

As this project is developed within a practice-led research framework, knowledge is generated through the development of a design, where the designer reflects on their own work to understand what works and what does not (Armstrong et al., 2020, "Evaluation and Reflection" section, para. 2). To support these reflections within an iterative methodology, I adopted a heuristic evaluation framework. Heuristic evaluation allowed me, as the expert, to evaluate my own work, rather than costly large-scale external playtesting (Smith, 2021). Given that flow is a subjective user experience (Dong Yu et al., 2022, p. 1), it is difficult to measure solely through observation. Therefore, due to time and resource constraints, conducting repeated, large-scale playtests to measure this state of flow would not be feasible within the timeframe of this research project. Instead, this project focuses on a heuristic self-evaluation to develop an initial exploration of how flow theory may be applied in VR and to create a small demonstration game that reflects the research outcomes. According to Smith (2021, p.68), "heuristic evaluation is a quick, cheap, easy, and effective method of evaluation suitable for VR games", highlighting its benefits within a practice-led project, as it allows for repeated testing throughout the development of this project without the pressure of timely and costly large-scale participant testing. Ideally, heuristic evaluation involves multiple domain experts.

While the best practice in heuristic evaluation is to use multiple experts, this helps reduce the risk of missing mechanics that might seem confusing to a first-time player. This was a factor I considered with my work but ultimately decided as an indie developer creating my own project, I took on the role of the playtester as due to resources and time frame I found that attempting to gather enough experts within the field would prove too challenging as even Smith (2021, pg.67) found gathering experts within the field for his games requirements challenging with a smaller budget. Instead, I decided to develop a list of criteria to assess my design and to align my research with the creation of flow through embodiment in VR. Through this method, each of my prototypes was reviewed against a set of criteria that supported sustained flow, embodiment, and player engagement, allowing issues to be identified and refined throughout the process.

This heuristic self-evaluation approach involves using flow-state criteria markers, as detailed in the literature (see Chen & Yuan, 2025; Csikszentmihályi, 2009), and translating them into a set of statements and questions to evaluate gameplay. I developed this criteria based on my previous research, deriving a list of seven statements and questions from flow theory in VR.

Flow and Embodiment Criteria:

- 1. Clarity of Goals: 'The player should always understand the goal they are trying to achieve'**
 - a. Do I clearly understand what I am supposed to be going through throughout the game?
- 2. Challenge Versus Skill Balance: 'The gameplay should feel challenging but manageable'**
 - a. Does the gameplay consistently challenge me?
 - b. Were my tasks engaging without becoming overwhelming or frustrating?
- 3. Clear Feedback: 'The player's actions should feel responsive'**
 - a. Does my game have clear feedback?
- 4. Sense of Control (Agency): 'The players' actions should feel under their control'**
 - a. Do my interactions feel intentional and under my control?
- 5. Attentional Absorption: 'The player's attention should be consistently directed toward the game world rather than the interface or technology'**
 - a. Do I feel like I am losing track of time?
 - b. Am I absorbed within the task, not the interface?

- 6. Embodied Presence: 'The player should feel embodied within the character and virtual environment'**
 - a. Do I feel physically and perceptually situated within the virtual body and environment?
- 7. Flow Disruptions: 'The player should not experience any breaks or glitches which bring them out of the experience while in gameplay'**
 - a. Where did engagement break, and I lose the sense of flow?
 - b. Why did it break?
 - c. What caused the disruption?

Chapter Four: Documentation of Practice

4.1 Introduction

This section documents the process of developing a VR game centred on the flow state, exploring how embodiment was created through interactions and challenges within a virtual space. In the game, the player takes on the role of a teenage girl who has recently lost her sister under mysterious circumstances. The gameplay backdrop is that the character has begun a séance to contact her dead sister, but the ritual has gone wrong, and malevolent spirits have entered, along with her sister's ghost. Players are introduced to this scenario and must manage four simultaneous tasks: keep the ritual candles lit to protect from malign ghosts, defend the séance circle from incoming ghosts in the hallway by shutting the door, stare down ghosts at the window to scare them off, and allow the character's sister's spirit to enter the circle by keeping the door open for her or not looking at her in the window (Figure 6). The more successfully the player manages these tasks, the closer they get to contacting their sister one last time. If the player lets too many bad spirits into the circle, their health (in the form of a 'sanity' score) reduces; a lose state is a score of zero, and a win state is lasting the set amount of time, 5 minutes. The challenge progresses incrementally, with early levels being slower-paced and easier to coordinate while the player gets used to the tasks, and later levels becoming quicker and more complex. These mechanics were designed to create a challenge that gradually gets harder without overwhelming the player, in an attempt to prolong their engagement and focus throughout the full five-minute span of the game.



Figure 6

Window and hallway ghosts within the VR game prototype.

Researching flow and developing a product for sustained flow presented many challenges, in which my ideas were often stronger than the technology or my skill set. This led to constant adaptation of my ideas to create an enjoyable experience that avoided frustration. My final game is a demonstration of the possibilities of the flow state in VR games, and to achieve this, my design decisions prioritised creating flow and embodiment over a polished final product.

4.2 Game theme

In the initial conceptualisation phase, I focused primarily on creating a comedy-based game that used laughter to promote relaxation and support a flow state. However, through the development of early sketches and animatics (Figure 7), I struggled to find a clear link between the comedic jokes and the heightening of a player's flow state.

Existing research, as supported by Bartzik and Peifer (2024, p. 628), suggests that laughter and humour may reduce stress, a finding linked to the concept of flow. But they also note

that humour may be beneficial in reducing stress, but it still lacks evidence on the “interplay between humour, stress and flow experience.” This limitation posed a challenge to my project, as there was limited understanding of how comedy alone could sustain long-term engagement and flow.

Upon reflection on my early comedic sketches and animatics, I decided that humour, stress relief, or relaxation were not what I was aiming for in the emotional connection in my game. Instead, I looked into the possibility of creating engagement through tension, urgency, and fast-paced decision-making, as these emotions are likely to lead to quicker, more focused attention and skill-based challenges.



Figure 7

Collection of images from my initial visual development sketches exploring environment design, menu interface, and gameplay sequencing for comedy.

As a result, I decided it would be more effective to shift my game's theme towards a horror-based gameplay. The horror genre in game design is often used to create tension and urgency through fast-paced, high-intensity decision-making, engaging players in “intense focus and quick decision-making” (Khanganba & Ubaradka, 2024, p.458). This aligns with flow theory, which holds

that sustained attention is essential. Heightened emotional engagement is also linked to creating immersion, “underscoring that greater emotional engagement in the game is linked to a deeper sense of being ‘in the game’” (Khangnba & Ubaradka, 2024, p.458). As a result, horror-based designs can support the conditions necessary to maintain players' engagement, thereby prolonging the flow state.

I decided to utilise my own interest and previous knowledge on the paranormal to develop my new concept. I explored narrative themes around grief and sudden loss. My Initial ideas included the player walking through a town whilst interacting with her dead ghostly sister. I designed a mind map to guide the initial iterations of this idea (Figure 8). This approach was going to explore dark themes of loneliness and family abuse with a twist of dark comedy to lighten up the mood. The initial concept art explored a darker comedic theme; this was shifted to removing comedy entirely, as the comedy aspect felt disrespectful, as the topics weren't something I have personally experienced (Figure 9).



Figure 8

Dark Comedy Themed Narrative Mind Map.

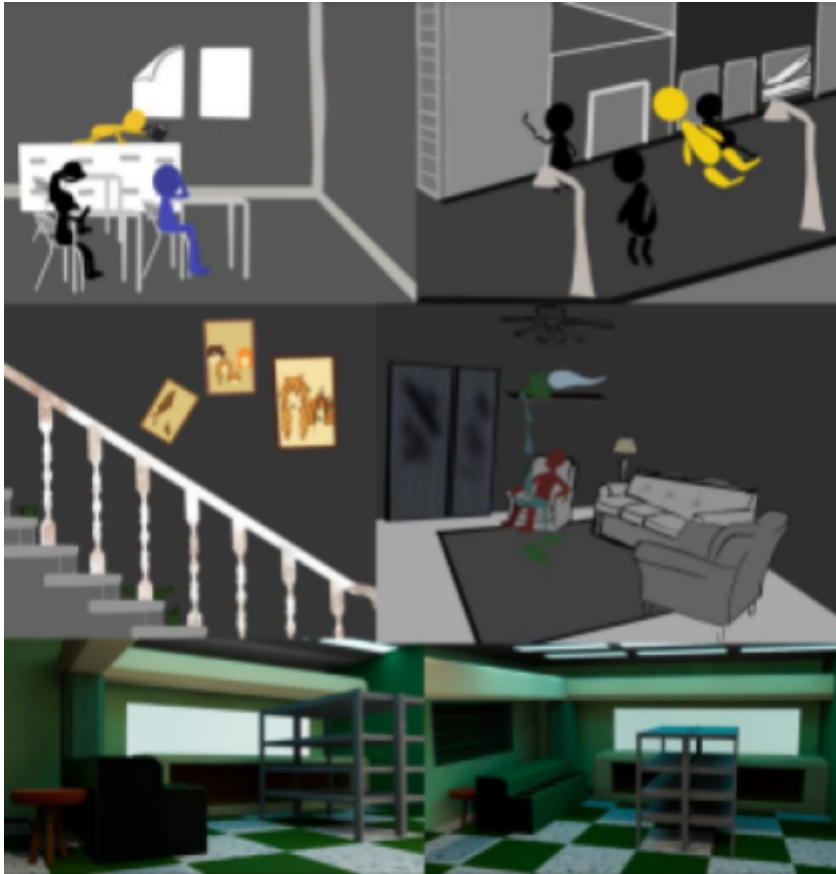


Figure 9

Concept Images From the Game Prototype: Exploring Dark Comedy Themes.

From this, I decided to remove comedy entirely, as it was not needed to support my focus on flow. My new idea kept the paranormal topic, as it interested me, but instead focused on the concept of losing a loved one and contacting them through a séance. The idea involved an older sister character (who the player controls) conducting a séance to contact her recently passed sister, but instead of just letting her sister in, many other malevolent ghosts are also released, and the player now has to keep the hostile ghosts out while still letting her sister in.

This approach was better aligned with my research, as it offered emotional motivation, allowing me to play around with the narrative and environmental storytelling, whilst also creating tension through a spooky topic and challenges. The player was no longer just walking around looking for clues but was fighting for survival whilst discovering a meaningful narrative that revealed how she got there.

This led me to design a small mind map of how my game mechanics would work (Figure 10). My

initial idea for the challenges would be a ghost coming down a hallway: when you look at it, it freezes; when you look away, it gets closer, and the séance candles slowly blow out. You must keep them lit, or you go insane (lose state).

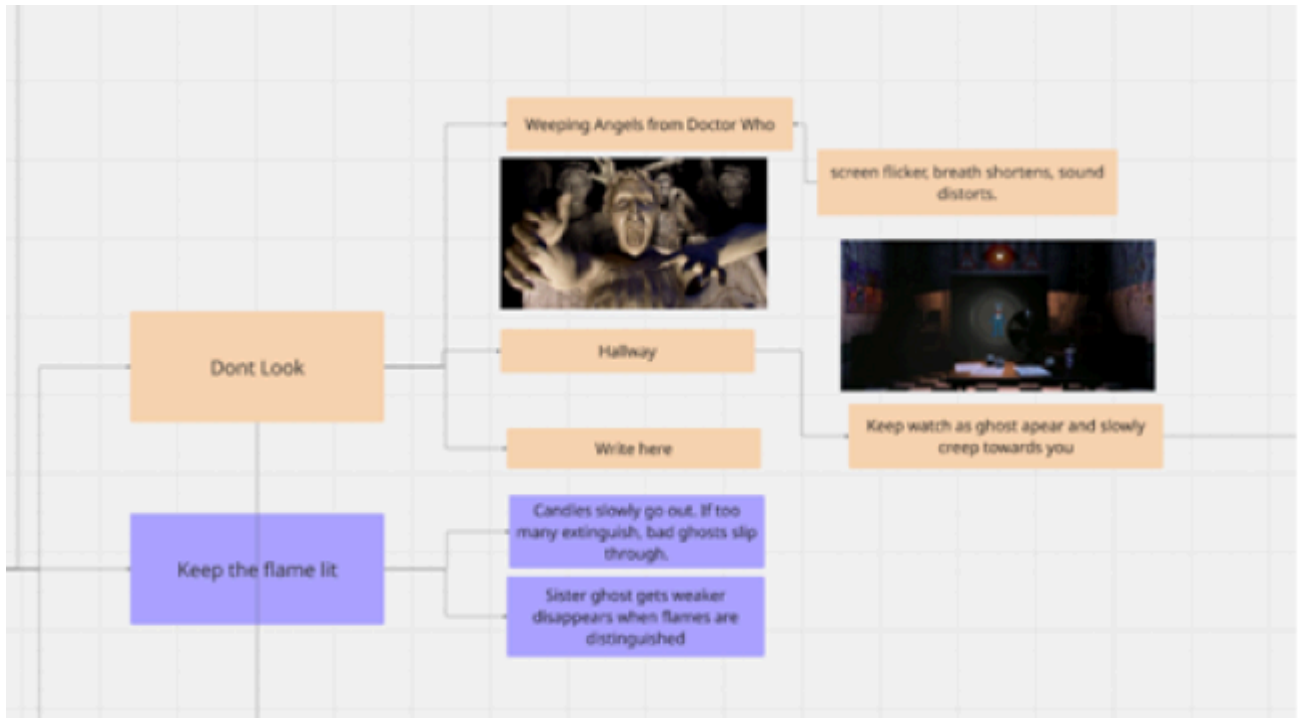


Figure 10

Early mechanic mind map in Miro exploring gaze avoidance, candle maintenance, and escalating ghost encounters.

The original plan for my VR game was an open-world game where the player could move through the space, feel it, and discover the world around them. This led me to design a full world map (Figure 11). I designed the main house, the streets, and even different outdoor locations that would be interactable; for example, the school, where the ghost character can cause mischief by pushing over objects to distract the class.



Figure 11

Screenshot of the Original Open World Map Design.

To test this idea, I decided to develop a small, fast-paced prototype through a game jam. A game jam is a quick event in which communities can set a theme, and everyone creates a playable game based on it, encouraging fast-paced experimentation and iteration (Falk, 2022). This game jam was made by the YouTuber Jacksepticeye (Jacksepticeye 2025, ltch.io) and was completed over four days.

This game allowed me to explore embedded narrative within a flat-screen game, where the player is free to roam and discover tasks across the map (Figure 12). On reflection, having a large space often forced me, the player, to walk around aimlessly without clear direction. While it initially sparked curiosity as the player explored the new world, the repeated paths became monotonous. I interpreted this as a disruption of my goal-clarity criteria, as concentration faded and boredom set in, interrupting my sense of flow. I decided to test whether my reflections on open world environments in flat screen games translated similarly within a VR space - the VR mode of Resident Evil Village (Capcom, 2023). I realised that Resident Evil Village VR uses a semi-open

world (Figure 13), and its immersive use of tension is highly impactful, putting me in a state of flow as I become attentive to every little sound or movement. The disadvantage of this semi-open-world concept was the constant risk of getting lost on the large map, with long periods of downtime in areas I had already explored and where there were no enemies. This would allow me to ease the tension I was feeling and gain a sense of safety. Similar to the game I made for the game jam, I faced the same confusion as I aimlessly walked around the large map. In VR, this issue was more noticeable because navigation isn't like natural body movements; you are in a virtual world, and your body cannot physically walk long distances. This made me more aware of the controls and the headset, as I had to move around the space using a joystick.

In these quieter moments, I often removed the headset for breaks, as the pause in tension made me realise my eyes were sore or that I felt motion sickness, unlike in high-intensity scenes, when I was more focused on the challenges around me. Overall, I found that my state of flow was highest in highly active areas, particularly when defending myself and reacting quickly, as I no longer thought about the game but only what was happening in my virtual space. Another major limitation in VR is movement: I always stayed in the same place while my character moved through the space, and I lost my sense of embodiment because I no longer moved as my digital avatar did. In these scenarios, I found that when placed in a stationary digital avatar, I had a more immersive experience, as I was able to lean and move, mirroring my digital avatar. I also noticed that when challenges came my way, my attention was fixated on the immediate tasks laid out in front of me, creating a clear, focused space and a stronger sense of presence as I became more immersed in the virtual environment.



Figure 12

Screenshot images from the game jam project KILLER Job.

Note. Screenshots from *KILLER Job*, developed by @druoodle, @Yawnszzz, @Poly_Panda_Ex, and @Shmakk, 2025.



Figure 13

Interactive map of the village area in Resident Evil Village.

Note. Screenshot from MapGenie's *RE Village Map* interactive map.

Although the open-world structure allowed the player to explore, the player's immediate objectives were unclear. Large spaces and dispersed tasks created uncertainty and confusion about where to go next. During playtesting for the game jam, I noticed that this environment disrupted my flow and caused me to lose focus. This also resulted in a lack of challenge, as the long walks between tasks reduced tension. The exploring aspect was engaging, but it slowed down the game's overall pacing, making it feel boring and repetitive as I walked the same paths over and over. However, I did feel strong moments of flow during action, such as discovering hidden objects or completing the sacrifice circle. These moments delivered clear gratification and encouraged me to continue. However, these moments were short and too far apart, so I would get bored and become aware of the outside world during breaks, since there were no immediate dangers. In the context of my game, these playtests suggest that sustained flow is more likely when players are challenged to an appropriate level, with open-world exploration becoming less of a focus.

4.3 Bringing the challenge to the player

This learning influenced me to design a simple, limited environment where the player can interact

with the objects around them, similar to Five Nights at Freddy's. I decided to take one of my concept images and develop it by basing my environment on the player's home. Since I wanted to stick to my paranormal narrative, I decided that a "séance gone wrong", where the player must stay inside a small séance circle and keep the bad ghosts out, would be an interesting way to lock the players' movements while bringing the challenge to them.

I created a prototype floor plan for my game (Figure 14), which served as the basis for the three-dimensional models needed to build the game's space. I modelled everything in Autodesk Maya, starting with the base room: walls, candles, and windows. Designing one room allowed the player's position and sightline to be smaller and easier to control, since there were fewer areas to focus on.

It also benefited environmental storytelling, as the smaller space enabled players to notice clues and objects without the distraction of a larger space. By reducing the need to move across a wider world, the player could focus more on the immediate challenges, engaging with them within the scene. There is no downtime once the game starts, prolonging the time they are in a flow state.

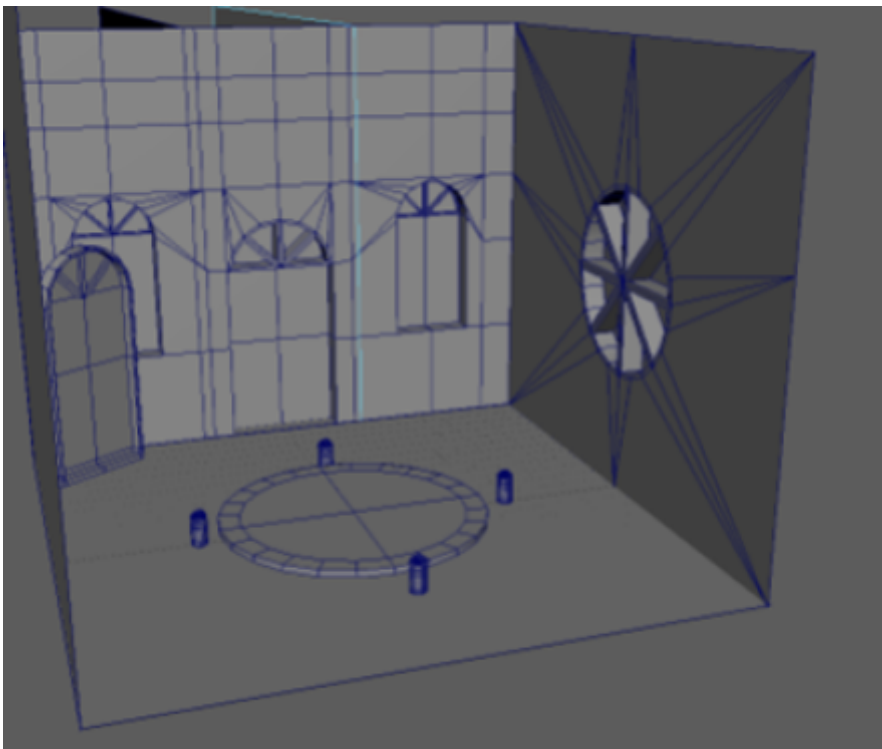


Figure 14

Early room environment model developed in Autodesk Maya.

Overall, this improved the clarity of my game, as the player now has less space to get lost in, making their tasks obvious and easier to understand: maintaining the séance and surviving the threats. The confined space also helps me design my challenges. As I only had to focus on a single space, I could design layered tasks that directly confront or surround the player, creating urgent, repetitive tension.

4.4 Controllers or Hands?

The first prototype of my game's controls featured the VR controllers visible in the player's hands. This provided immediate, clear feedback when I was unsure which controls I wanted in my game, and I was able to play with haptic feedback, enabling me to implement vibrations that respond to the player's interactions within the scene. This provided immediate feedback on one of Rutrecht et al.'s (2021) components when creating flow. This avoided frustration, as the controls were clear and responsive. In early testing, I noticed an issue with the players' interactions: when they picked up an object, it would float in front of their hands, defying gravity (Figure 15). When measured against the flow-state criteria of embodied presence and sustained concentration, this weakened the game's experience, as the object no longer obeyed the laws of physics, and the distortion, although minor, was enough to signal a disconnect in the player's natural movements. This reduced the perception of the object's presence within the player's space, disrupting their attention to their environment and shifting it more toward the controls. Zhang et al. (2023) highlight, in their research, how to create body ownership illusions in a game. They highlight how hands can benefit embodiment: "Participants can interact with the virtual world by controlling the virtual hands (e.g., grabbing or moving) in first-person perspective" (Zhang et al., 2023, p. 2).

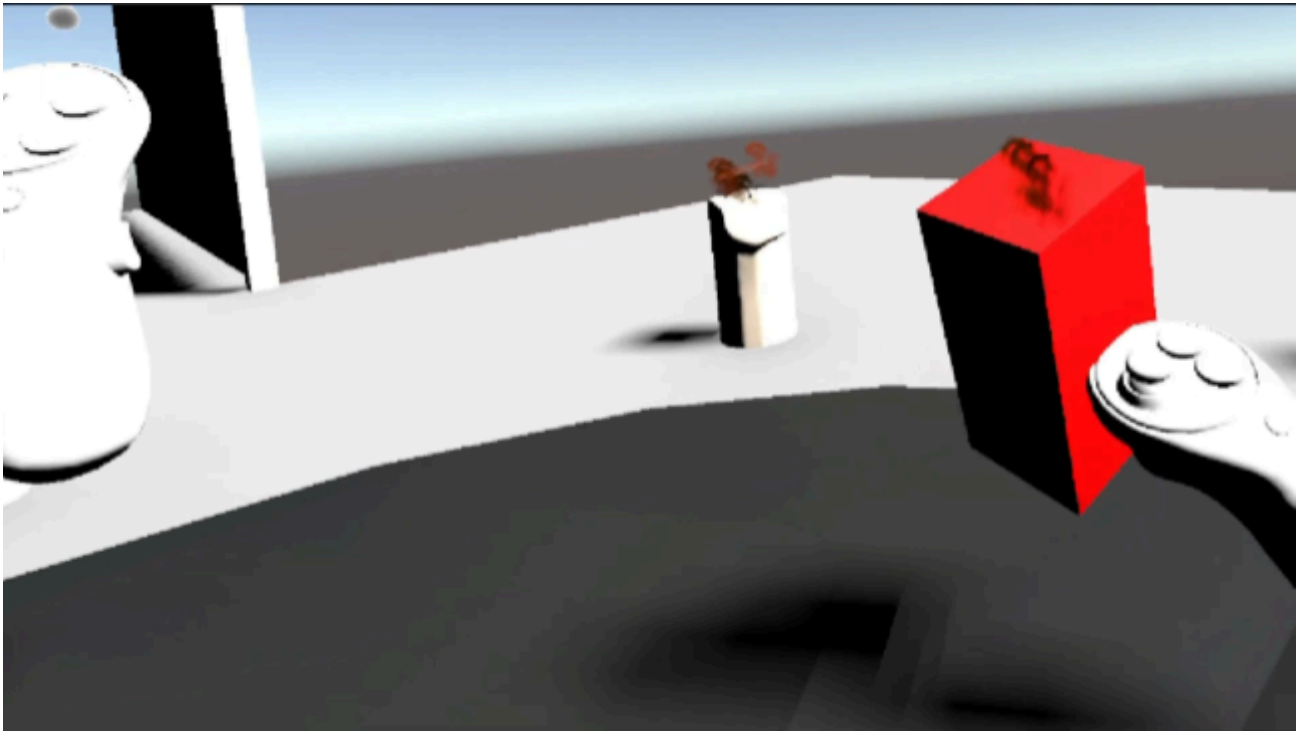


Figure 15

Unity prototype testing controller-based interaction through grabbing the lighter.

Lee's (2024, p. 19) research notes that interactions using "only their hands and fingers, without any additional devices or accessories" blend the player more naturally into the character's body. My game's overall controls were going to be simple: pick up a lighter and close and open a door. This led me to explore hand tracking as the tool for my game's interactions, as it seemed the most natural to the player's body movements, enhancing the sense of embodiment and giving the player a sense of control, both of which are needed to develop flow within a game.

This early prototype tested the difference between controllers and hand tracking (Figure 16). When evaluated against my heuristic criteria, the hand-tracking created a deeper sense of embodied presence, as the interactions felt more natural, and I did not have to worry about where a button was on the controller. This allowed for greater attentional focus on the tasks at hand as there were fewer controls to remember.

However, it lacked a sense of control, with less precision than the controller, and I did not get the haptic feedback like when pressing a button, making the interactions feel less reliable. This often led me to drop the lighter and lose it on the floor, disrupting my state of flow and leaving me flustered. These findings suggest that hand tracking improved the feeling of presence, but because it was unreliable, controllers may have been a better option for gameplay.

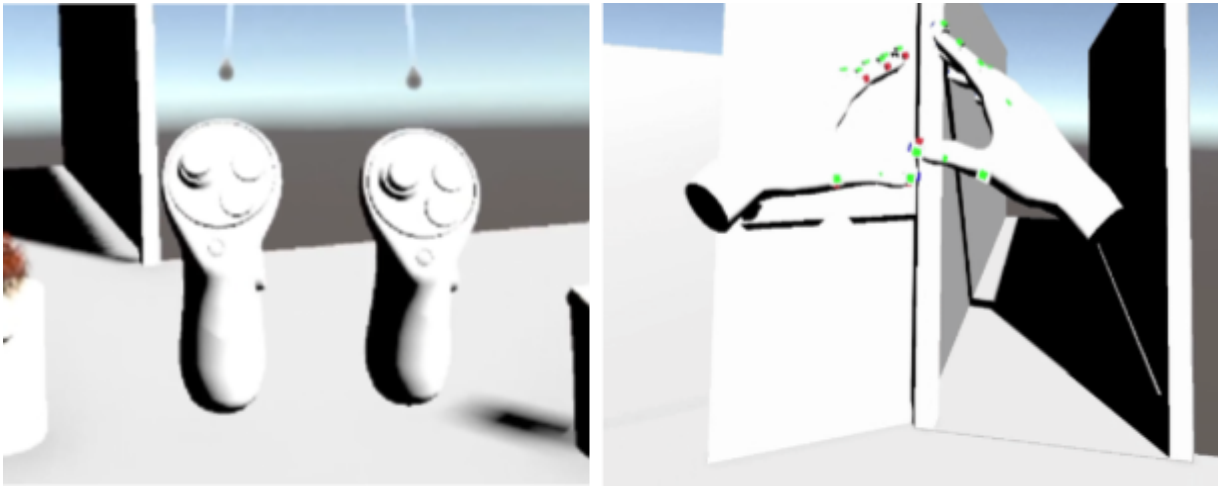


Figure 16

Unity prototype testing controller and hands.

4.5 Challenge vs Skill

To create a challenge in my game, previous research suggests I should carefully balance it with players' skill levels to ensure they learn gradually through play, stay in a state of flow, and avoid frustration. The challenge of my game revolves around the séance, which allows too many ghosts into the mortal realm. I conceptualised my challenges through a Miro board mind map (Figure 17), designing how I wanted my enemies to function. The first challenge I designed was to keep the bad ghosts out of the circle and let the good ghost (her sister) in. My two focus points are the non-playable ghost characters (NPCs): a system that uses eye tracking to discourage you from looking at the NPC ghosts, and the candles for the séance, which slowly blow out; the objective is to keep them lit.

To address this, I created a system of staggered events that meant the challenges were not too difficult and could slowly increase in difficulty or, in this project's context, increase in spawn rate, gradually challenging the player based on their skill level and supporting flow.

My torches follow a similar "spawn rate increase": as the game goes on, the rate at which they go out speeds up. I noticed this during the prototyping phase: as the player was figuring out the scene, having the candles go out immediately caused unnecessary stress. This required a higher skill level than the player was ready for, disrupting their flow state because they were still new to the environment. Instead, I used the same technique: I had the candles blown out slowly, and as the players started figuring out how the mechanisms worked, it sped up, with candles blown out to create challenges in every direction from the players' perspective.

4.6 Removing UI / Embedded Rules

I decided to make it so that all the challenges will affect the overall scoring system in my game. This acts as a simple scoring system, with 100 as the maximum score, decreasing and increasing from there. This reduced distractions; however, once in the game, it was hard to keep track of the players' scores. Previous research indicated that UI embedded in the environment is more effective in keeping the players' attention, so having a health bar on-screen indicates it would disrupt my game's immersion. In response to this, I explored audio as a means of indicating scoring and 'sanity'. Ng and Nesbitt (2013) refer to this approach as "auditory icons", stating that it allows for a more "direct understanding of the situation and allows for quicker feedback regarding the player's current health level" (2013, p. 8). Similar to the survival game Resident Evil Village VR (Figure 18), breathing is used instead of a health bar to indicate injury. This allows the player to stay within the scene, since there is no user interface to distract them. I wanted to emulate this in my scoring system by using breathing sounds as the player's score decreases, to display them slowly going insane, like the ghosts.



Figure 18

VR knife interaction in Resident Evil Village, demonstrating embodied hand-based combat mechanics.

Note. Screenshot from the *Resident Evil Village* web manual (Capcom, 2023).

I implemented this using the greater-than-or-equal-to and less-than-or-equal-to operators in my code (Figure 19), so the game would play audio cues if sanity fell below a certain threshold. During playtesting, audio cues proved more effective than a traditional UI, as I was able to stay present in the scene and aware of my surroundings rather than diverting my attention to a menu screen. This highlighted attentional absorption and embodied presence, as feedback was delivered through an embedded narrative, aiming to keep all UI elements within the main scene and maintain immersion by preventing the player from leaving the space or being interrupted by unusual UI elements.

The audio cues, especially when my supervisors played my game, were often not enough to let the player know their health was depleting. To help with this further, I will add visuals that match the audio cues, so the player's visuals and hearing change as their health decreases, further enhancing embodiment.

```
if (sanity < 20)
{
    AudioManager.instance.PlaySFX("Breathing");
}
else
{
    AudioManager.instance.StopSFX("Breathing");
}

if (sanity > 20)
{
}

if(sanity <= 0)
{
    gameOver.SetActive(true);
    Time.timeScale = 0;
}
```

Figure 19

Unity C# code controlling sanity score and gameplay feedback.

I decided to incorporate visual elements into the score display, using chromatic operations on the environment and the player's vision to visualise the player losing their sanity, with the effect increasing as the player's sanity decreased (see Figures 20 & 21). This allowed me to create a sanity scale similar to a traditional UI health bar, without taking the player out of the scene with distracting text.



Figure 20

Prototype Unity scene with chromatic aberration and film grain effects enabled.



Figure 21

Prototype Unity scene without chromatic aberration and grain.

I also decided to explore adding UI interfaces within my game through environmental storytelling,

embedding them within the scene. To achieve this, I modelled a radio in 3D and added a five-minute timer to the front, disguised as a clock (Figure 22). This clock starts at three ante meridiem, the witching hour, and continues to play until eight ante meridiem, the morning in which the game ends. This allowed the game's time to be communicated through the environment. During playtesting, I noticed that without a timer, the game time would start to feel longer, and tasks would feel never-ending. Evaluating these tests, I noticed the embedded timer created structure to my game (Hu et al., 2024, p. 1). This was developed to communicate how much time remained to strengthen clear feedback and goal clarity without having external interfaces. This is intended to keep their attention for longer without disrupting the flow.



Figure 22

Unity prototype environment showing the diegetic radio clock used as an in-world timer.

This prototype focused on removing traditional UI elements to heighten the feeling of embodied presence. Aspects like replacing on-screen health and timers with embedded cues, such as audio cues and digital clocks, highlighted attentional absorption, as the players' focus remained within the scene, with nothing popping up or blocking their vision.

4.7 Full Game Play Test/Making Goals and Intentions Clear for Players

From these initial prototypes and reflections, I developed my base game and conducted some informal personal playtests to assess my project so far. Using my own heuristic criteria for flow, I evaluated how a full playthrough felt in relation to my subjective experience. Regarding clear goals and feedback, for people who might not have previously understood my game tasks, the tasks could feel difficult to understand and vague about what they were required to do when entering the game for the first time. I knew, going forward, I needed to find a way to explain how to play the game without pulling the player out of the environment. This is supported by Rutrecht et al.'s (2021) study on flow, which concludes that poorly communicated rules and strenuous challenges can disrupt the player's flow state, leading to frustration.

To address this issue, I reconsidered the design of my game's opening narrative and returned to the conceptualisation phase. I redrew the layout and play style of my game, which helped me create a clear breakdown of its controls. As a result, I simplified some tasks in my game to better communicate the objectives and avoid confusion. For example, the earlier window ghosts design functioned differently from the hallway ghosts. If the player looked at the hostile ghosts that came through the window, they would gradually lose points from their sanity score, whereas looking at her sister increases it. Conversely, the hallway's ghosts follow a path system, and the player had to shut the door before they reached the end; otherwise, points would be deducted from the sanity score. When assessed against my criteria, I noticed it was a major disruption to the flow, as it was hard to communicate all these points to a new player whilst keeping them within the scene, causing confusion and a lack of control.

From this, I changed my window ghosts designs to better pair with the hallway ghosts, making it so that if the player looks at them, they disappear, if they let them in, they will deduct points from the score system, but the player needs to be careful, as looking at their sister will make her disappear, resulting in the player pushing her away, losing the connection needed for the séance. This made communicating the rules of the game a lot easier, as it was solely just to keep the bad ghosts out, either by looking at them or shutting the door and letting their sister come through.

Now that I had changed the challenge in my game, I did a playthrough and realised that my use of a sanity score was no longer clear, since my scoring system had shifted to "the more they let her in, the better". I needed a way of displaying this. I decided to visualise this through a framed picture of the player's character and her sister (Figure 23). The more hostile ghosts they allowed

into the space, the more the player lost connection with their sister, turning the one normal image into a decrepit photo of the person they lost (Figure 24).



Figure 23

Screenshot of Sisters Picture in Frame in Game Prototype.



Figure 24

Original Artwork of Sisters Alive and Dead.

4.8 Incorporating Embedded Narrative

Now that I had a clear layout of my game's rules, I used embedded narrative to create an introduction space where players could learn the rules before playing. Instead of relying on external menus or tutorials, I wanted the rules to feel like a natural part of the virtual world. To do this, I used a laptop placed within the world spaces as an interactable object, allowing the player to interact with the environment immediately. This laptop would explain the rules of the game, using eye-tracking to direct players' attention to a screen displaying a website on how to start a séance (Figure 25). This fabricated website allows the player to feel as though they are an amateur conducting a séance from a tutorial they found online, whilst receiving all the necessary information.

I also experimented with eyetacking. Once the player's attention was locked in, looking only at the screen, the rules would start scrolling, as if on a website. Originally, the eye tracking would detect if the eyes are looking at the screen and only then play the animation, and if the player looks away, it would pause, but later this was changed to just looking at the laptop initiates the animation, then they are free to look around the room as it plays. This caused frustration, forcing the player to focus on a single object for an extended period.

One implication I noticed when designing this rules sequence was that, although the text was small, it made it harder to read and, for some players, might cause frustration as they had to lean towards the laptop. To resolve this issue, I decided to try locking the players head in a closer position to the computer to ensure they were able to read the text but when playtesting this I realised quickly that this would not work as it immediately created motion sickness as I could look around but my head was no longer in place with my body creating a mismatch between what was perceiving and how I was positioned in the space (Jerald, 2015, p.164).

Since I could not move the player, I decided to try out audio cues. I added a voice recording of the main character reading the rules, as if she were reading the laptop website out loud. This allowed me to relay the rules of the game to the player without taking them out of the experience.

I also played around with adding audio cues into my game, doing some voice acting and editing it to sound like the ghost sister. This allowed me to add audio cues throughout to prompt the viewer on how to play. This helped prolong the time spent in flow state by avoiding the player's frustration at not knowing what to do.

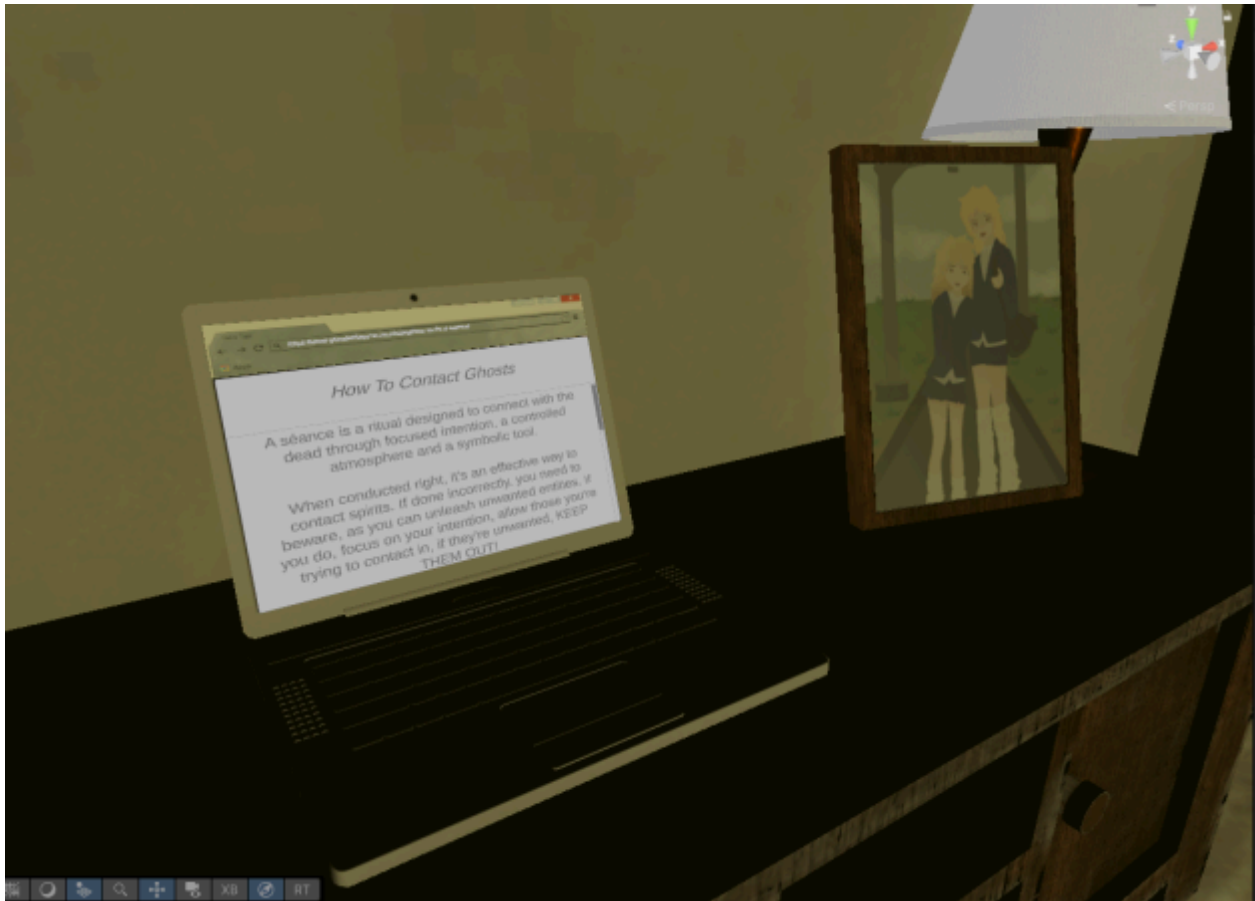


Figure 25

Screenshot of Prototype of Laptop UI.

Chapter Five: Critical Reflection

This study set out to explore design techniques that showcase the possibilities of VR game design for fostering a flow state in players through overall design and newer mechanics, such as eye-tracking, that bring players into the space and create a sense of embodiment.

The findings suggest possibilities to heighten flow within VR. My work explores techniques and design methods that can heighten flow, such as hand controls to create greater embodiment than controllers, and why eye tracking should be considered a mechanic rather than just a tool for optimisation. It also explores how you can remove unnecessary noise and design to keep the player within the scene, extending the time they spend in a state of flow.

5.2 Challenge Vs. Skill

The overarching design technique I developed throughout my game was to balance challenge with skill. Using Dong Yu et al.'s (2022) definition of flow as a balance between the level of skill and challenge of the task, I structured my gameplay to increase in intensity gradually. At the beginning of the experience, the player is introduced to the game via an audio explanation of the rules. Once the game starts, the enemies' spawn rate is slowed, allowing the player to familiarise themselves with their environment and the game's mechanics, such as eye tracking and the candle-lighting mechanic. As the game progresses, the difficulty increases, and enemies appear more frequently, requiring all tasks to be monitored simultaneously. For example, the player needs to manage the window so they can look at the bad ghosts before they come inside, without looking at their ghostly sister, whilst the candles are being blown out around them. They also need to relight these candles to preserve the séance circle and keep connected with their sister. While conducting a heuristic evaluation of how my game progressively introduced mechanics and difficulty, I noticed that this staggered approach allowed the player to encounter each challenge rather than be overwhelmed by many tasks at once. This also allowed me to keep the player focused within the scene, keeping the game's goals clear, and giving them a sense of control as they learn and understand what they are doing. This approach was effective for sustaining flow, as this demonstrates that although my game was not the most challenging, I could still gradually increase the tasks, making it more engaging as tension increased.

5.3 Hand-Tracking

Hand-tracking, replacing traditional controllers, produced a noticeable shift toward promoting embodied presence. Despite hand controllers showing potential to promote embodiment and flow (Lee, 2024), I noticed a limitation during playtesting: unreliability. The controls made picking up objects clear: the player knew they were grabbing when they pressed the button, and, as the designer, you could add haptic feedback, such as controller shakes, to let the player know they were in select mode. This made controllers more efficient at communicating with the player, but since my project focused on sustaining flow through embodiment, I preferred hand tracking. During playtesting, I found that my game didn't require many controls, so I did not necessarily need a controller.

Against the heuristic criteria, hand tracking helped sustain the sense of flow by reducing the reliance on controller inputs. Once I got a feel for the grab mechanic, natural interactions made me feel more present in the scene and helped me become absorbed in the gameplay rather than worrying about button inputs. Hand-tracking enhanced my sense of immersion, as my actions, such as grabbing and reaching, felt closer to my real-life movements (Figure 26). It did have its limitations, however. Interactions would often feel unstable because the headset's cameras showed the player's hands, which could cause the selected object to glitch or respond with a delay. During my self-evaluation, I noticed glitches would interrupt my state of flow, as I would lose the feeling of control in the scene. Especially when the game became faster-paced, it would become frustrating, as every second counts. In future, I might try having the main grabbing component, the lighter, stay placed within the player's hand throughout the whole game and allow them to pick up objects with their other hand, as that was the main object to ruin my sense of flow, as I would need to drop it and pick it up often.



Figure 26

Screenshot of the prototype game's grab mechanic.

From the perspective of developing flow, hand tracking shows potential. Hand-tracking required no knowledge of the controller buttons, making gameplay easier for a wider range of skill levels. Using hands was also closer to the players' natural body movements, meaning they could feel more present within the scene as their real body was able to flow with the digital one, aligning with Dastugue, Gollety, and Pez (2023), who suggest that mirrored interactions can strengthen the player's perception of presence within virtual environments. This led to engagement, as the player could focus on the tasks at hand rather than the integrations required to perform them.

Despite this, I concluded that simpler controls served my game better overall. Simpler controls enable a wider range of players to engage in the game without friction. I opted for a mirrored avatar instead to deepen embodiment and play with perceptions of reality (Dastugue, Gollety & Pez, 2023, p. 42). Future development, such as smoother tracking and feedback on the grab mechanism to let the player know when they are selecting through audio or visuals, could make the hands feel more reliable. Further testing could be done on the use of augmented reality within a VR game, including the representation of physical objects in-game. This could possibly heighten the sense of embodiment as the player has something physical to grab.

5.4 Eye Tracking

Eye tracking similarly offered a new way to design within VR. Rather than treating it as an optimisation tool, I explored its capabilities as a mechanic, using the player's attention as the challenge (Moreno-Arjonilla et al., 2024, p.7).

One of my eye-tracking mechanics involves a ghost that disappears once it is looked at. This forces the player's attention, as they must constantly monitor where they can look. During testing, this created a sense of presence, as the player was highly aware of their gaze and was required to make quick decisions about when to look and when to avoid looking. During self-evaluation, this mechanic appears to be more effective at supporting flow, as it required concentration, involved the player in the scene, and added another element of involvement through the player's natural movements (Kocur et al., 2020).

Since I was the developer and playtester, I found it quite easy to recognise which tasks used eye tracking and which did not. Once this game goes out to the wider public, though, I realise that not having any visual indication of where the eyes are looking may result in confusion. While the menu screen includes a small black dot indicating where the player is looking, this type of clear feedback is removed once the player enters the main game scenes.

To help the player understand where eyetracking is communicated in the rules, the rules sequence states, "Look at the blue ghosts" to make them disappear. But at times, such as at the beginning, the player must look at the laptop to trigger the animation, which can be confusing due to the lack of clear instructions. In the future, I might add a small tracking point to the player's eyes so they know where they are looking in the scene, even if only for the first few hostile ghosts, to help them better understand the game's goals. In the future, developments such as improved gaze precision could enable eye tracking as a mechanic, making tasks more intuitive and responsive. Future research could also explore how to adapt the gaze-based challenges to work across different skill levels.

Eye-tracking showed promise, highlighting its benefits as a mechanism rather than an optimisation tool. Due to its underdeveloped status as a game mechanic, it lacks clear feedback, making it harder for players to immediately understand how their gaze affects the scene. Eye-tracking is most effective for quick, fast-paced challenges or triggering events, as the player does not have to keep their eyes fixed in one position for too long.

5.5 Embedded Narrative and UI

Maintaining the players' attention within the environment was a significant factor in maintaining flow. Using techniques like embedded narrative allowed me, as the designer, to convey controls and other important information without taking the player out of their focused state. I originally created the base layout of my game without considering the implications of having no UI for its controls during playtests. Upon reflection, I decided the rules were unclear and had to reconsider how I would introduce the game to the player so they could understand how to play without being pulled out of the scene.

During my research, I noticed that VR games with traditional UI text were distracting, as they drew my attention away from gameplay (Figure 27). As my game was in VR, I wanted to make the player feel as though they were really in the virtual world. I found UI would disrupt the sense of flow, as in tense situations where the player can get lost in the task of surviving. During self-evaluation, I experienced health bars in the player's peripherals that made them more aware they were in a game, which could disrupt flow as they became aware of the game's experience.



Figure 27

Screenshot of the television displaying the prototype's earlier sanity UI.

In VR, I found a traditional UI timer artificial. This is where I decided that an embedded UI enabled clear communication without unnatural text that could affect the player's sense of presence; for example, rather than a timer plastered across the screen, I designed a digital radio with the timer displayed on the front. This allowed the player to see their game's progression whilst staying within the scene. The diegetic timer provided feedback to the player while keeping them physically present in the scene, limiting distractions.

5.6 Audio Cues

Sound design and embedded UI are effective ways to communicate rules in a VR game without ruining immersion. However, when it came to my main game rules, I found it difficult to incorporate so much text naturally. The option for a traditional rules page was considered, but it would risk drawing the players' attention away from the scene, making them aware of the interfaces, and interrupting their sense of embodiment. To combat this issue, I embedded the game's rules within the virtual space through environmental storytelling. I used a laptop (Figure 28) to display the rules on an online website, with step-by-step instructions for properly conducting a séance, paired with a voiceover reading to ensure the instructions were communicated in multiple ways.

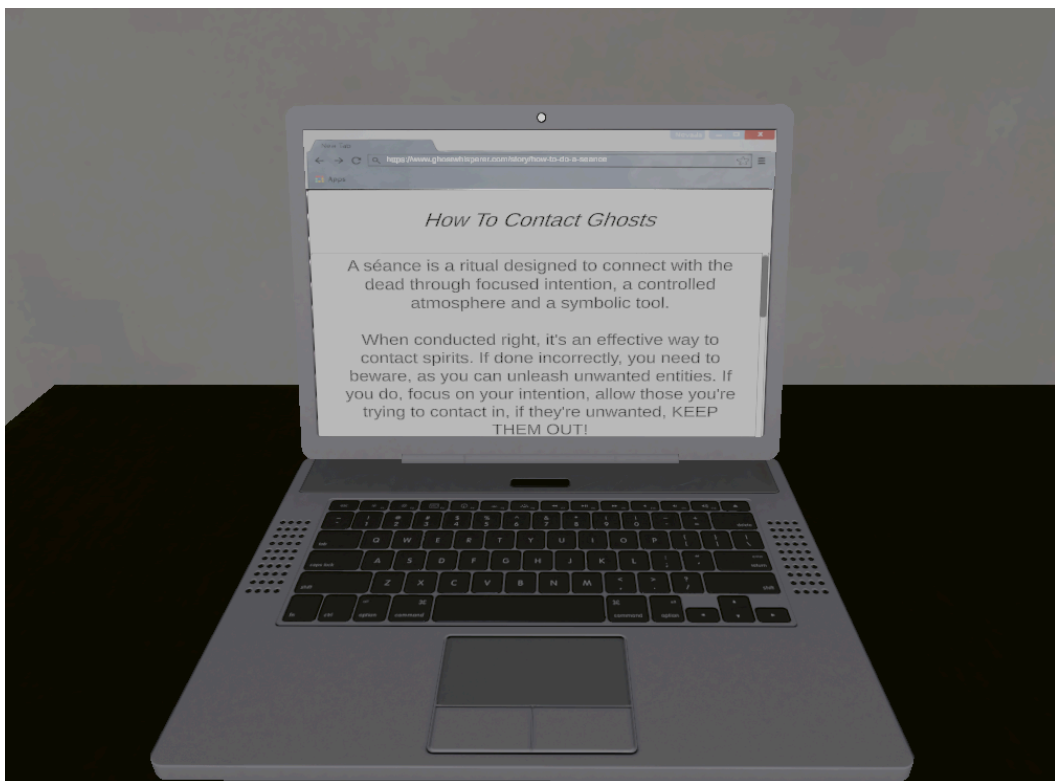


Figure 28

Screenshot of the laptop displaying in-game rules in the prototype.

I used eye tracking in this animation to keep the player's attention on the laptop. Once their eyes were tracking the screen, the rules would play; when their attention was diverted, it would pause, then re-attain their attention. However, once I created this design, I noticed that when using the

eye tracking to make sure the player's attention was always on the screen, it would start to create boredom as it was quite a long piece of dialogue, and after some reflection, I decided that a new player might appreciate the time to look around the environment. In the future, I might have my eye-tracking trigger the laptop animation, so it plays even when the player is not directly looking at it.

In the main game, I also experimented with audio cues. I explored audio cues throughout the gameplay. For example, a disembodied voice of her ghostly sister prompting her to open the door or to look at the ghosts, to guide the player through the experience, as it allowed the game to prompt the players that might have forgotten the rules throughout the game to nudge them back onto the right path to avoid frustrating them as that would quickly ruin flow if they are unable to play the game.

This aligned with my criteria for flow and embodiment, as I was able to communicate clearly with the player, clarifying their goals from the beginning, whilst also keeping them physically within the space.

Embedded narrative and diegetic UI were successful in my project. Using the environments to communicate with the player gave them a stronger feeling of immersion, as the world never felt fabricated. Hiding the game rules within the computer and communicating time via a digital clock helped focus players' attention on the virtual world rather than on external menus. However, when it comes to the game's rules, it was harder to find a balance between immersion and clarity. If the rules are too vague or atmospheric, players can easily get confused, breaking the flow as they enter the experience and leaving them unsure of what is expected of them.

5.7 Clarity

My project, at times, clearly communicates what players are meant to do on the laptop screen at the beginning, explaining how to start the sequence, how to light the candles, the types of ghosts they will encounter, and what to do when they see them. I added audio cues to enhance the game's clarity and guide the player in the right direction. My decision to embed my rules in my game through a website had its limitations, as I found it tricky to clearly communicate all my rules without making it sound like a set of rules that would take the player out of the scene.

Another limitation was due to being my own playtester; although it is a “cheaper and convenient” way of testing, it doesn't “provide information on how players will experience the game, but can predict problems before the game is released”(Yanez-Gomez et al., 2019, p.4940). I notice that in my own evaluations, I would overlook things like rules because I focused on the mechanics of my

game. However, my position as the designer and the evaluator limited my ability to notice issues that might present themselves to a new player. As I created my mechanics and environment, I tended to overlook areas that might not be explained clearly or that caused confusion. Adding the laptop explaining the rules helped, but I am still unsure whether this will convey to a wider audience, so this may need further testing. If I had more time, I would have a small playtest to test these small things that get overlooked as the creator.



Figure 29

Final prototype screenshots showing the room layout and environmental design in Unity.

Chapter Six: Conclusion

This project still has unanswered questions and opportunities for further research. My work relied heavily on heuristic self-reflection, meaning all the findings are based on my own design choices and perspectives. I did make some discoveries throughout this design process. For example, embedded narrative through environmental design and audio cues was effective at sustaining flow by communicating the game's goals whilst keeping the player present in the scene.

Hand-tracking showed strong potential to increase embodiment for the player through natural movements, though it had downsides; it remained unreliable and lacked the clarity of the controller's haptic feedback. In the future, as this technology improves at tracking players' hands, research into how it might enhance embodiment will be important.

Eye tracking proved most efficient for challenges that used larger hit boxes, as it is not yet accurate enough to allow the player to focus on small tasks for prolonged periods. Further research into eye-tracking as a mechanic could explore ways to work around eye shakes to create more in-depth challenges, inviting the player closer into their digital body and deepening the sense of embodiment.

Finally, balancing challenge and skill became a large focus within my study of flow. This was because it seemed to be the most efficient method for creating flow in games, as my studies found that games that guide the player without overwhelming them result in a much more positive experience. My gradual increase in difficulty allowed a range of skilled players to learn through gameplay, making the game more enjoyable for a wider audience.

Overall, this project positions itself as a documentation of ideas based on sustaining flow within VR. Although this took on a heuristic self-evaluation approach, which makes the work's findings subjective to my own designs and perspective, this research opens the possibility of larger-scale playtests and studies involving a broader range of participants. This would yield more reliable insights into these design decisions and how they lead to flow. Additionally, aspects such as my own skill level and technological constraints, such as eye- and hand-tracking, could be further developed to test it more closely in the flow state and get more definitive results.

Chapter Seven: The Séance

6.1 Gallery Set Up

My gallery exhibition was an opportunity to present my first final prototype to the public and observe how people interacted with the virtual space. Even though my work existed within the confines of the headset (Figure 30), I wanted the physical space to introduce the player into the world before they entered the virtual experience. I wanted the physical space to have a haunted atmosphere so that, when the player puts on the headset, they feel as though they're beginning the séance in the real world (Figure 32). With my dad's help, I built a black backing board around my table to create an enclosed space, with a cutout of ghosts flying across it. This set the scene for the paranormal experience they're about to encounter. I also laid out candles around the headset to create an eerie feeling, as if it were a cursed object about to transport the player into their digital avatar's body.

While I knew how I wanted my space designed, I had to consider safety precautions since I would be sharing the venue with five other people. I needed to create markings on the ground to stop gallery guests from entering the playing zone, but this could be an opportunity to disguise my hazard markings as part of the game space. This gave me the idea to transform the two-meter circle into a séance star similar to the flooring in my game. Originally, I wanted it to be chalk to mimic the digital environment, but I found it wasn't visible on the smooth concrete floor, so I switched to a vinyl cutout and stuck it down to ensure it would last the full three days of the gallery event.

6.2 Playtesting

This exhibition also acted as my first opportunity to conduct an informal playtest (Figure 31). I was able to watch people experience my game for the first time, see how they interact with the environment, and check whether the instructions are clear. One of the main issues I noticed was that my instructions could benefit from shorter, clearer guidance or interactive cues, as many people spent time looking around the room, anticipating that the game would begin. This resulted in players often missing vital gameplay rules, such as closing the door and forgetting to reopen it to let the sister in, as well as attempting to close the window, even though it was never a mechanic listed in the rules' explanation. The audio cues throughout the experience were beneficial in redirecting the player back on track.

I noticed that, due to its short duration, many of the players quickly became immersed in the scene, with some genuinely frightened. Overall, this informal playtest allowed me to notice weak points in my game that could disrupt the flow due to unclear instructions and environments, for future development.

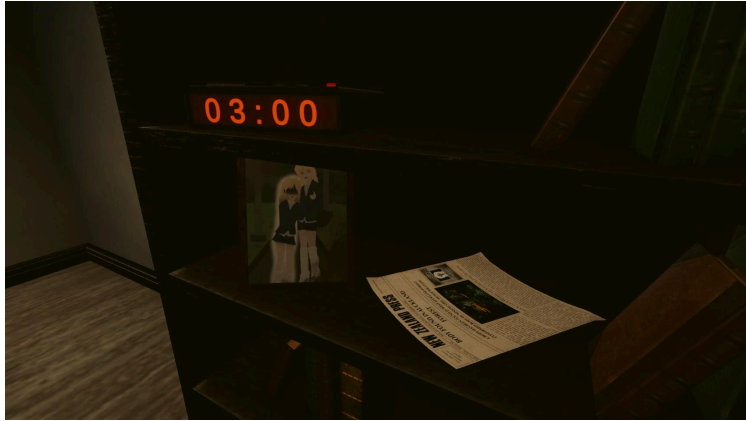


Figure 30

Collection of in-game images.

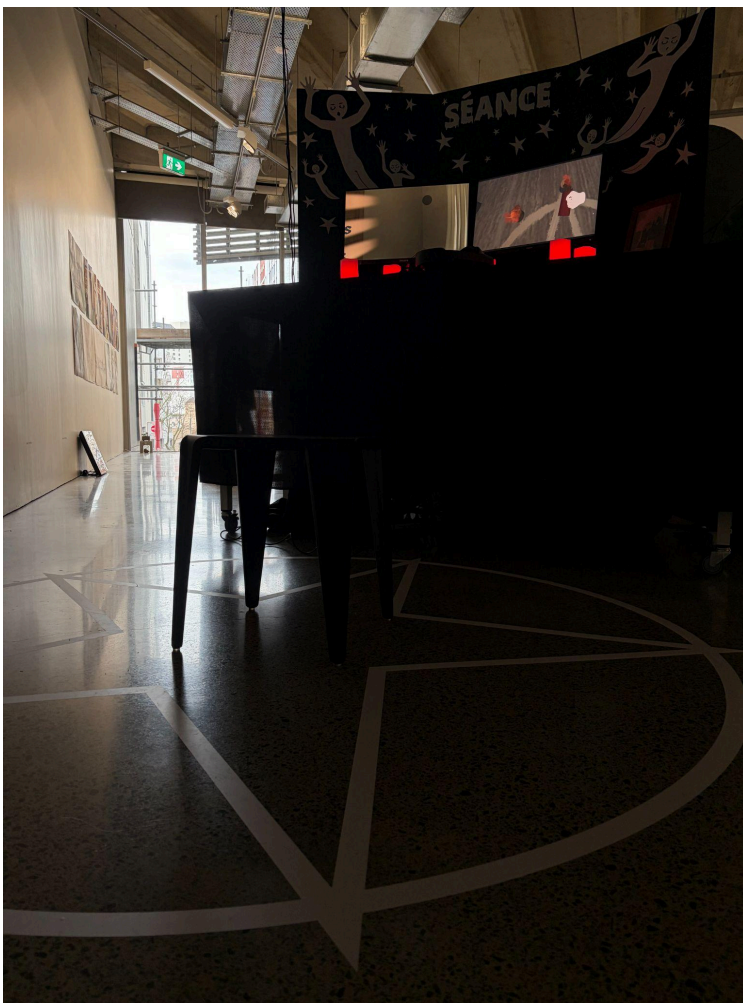


Figure 31

Collection of images of display setup and interactions with the game.



Figure 32

Exhibition Table.

Check Out the Final Game: <https://druoodle.itch.io/seance>

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