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Creating Project Contrast: a Video Game exploring Consciousness and Qualia

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**Creating Project Contrast:
a Video Game exploring Consciousness and Qualia**

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Abstract:

Project Contrast is a video game that explores how the unique traits inherent to video games might engage reflective player responses to qualitative experience. Project Contrast does this through suspension of disbelief, avatar projection, presence, player agency in storytelling, visual perception, functional gameplay, and art. Considering the difficulty in researching qualitative experience due to its subjectivity and circular explanations, I created Project Contrast not to analyze qualia, though that was my original hope. I instead created Project Contrast as an avenue for player self-reflection and learning about qualitative experience. While video games might be just code and art on a screen, through the integration of the various methods mentioned, these video games can create qualitative experiences akin to those of reality, especially well-designed video game worlds. When designing Project Contrast's game world, I world-built with concept art to create an immersive and thought-provoking setting that contextualizes the game, rooting the player in the world. I then brought that world to life with animation and art and used heuristic storytelling and coding to complete the game through the introduction portion titled The Labyrinth. As an artist, my work centers around qualitative experience, so I sought to create something that explored the phenomenon in a medium I loved and could share with others: a video game.

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Introduction

Since their inception on a small oscilloscope screen as *Tennis for Two* in 1958, video games have evolved alongside technology to become actualized as virtual reality, augmented reality, and are becoming increasingly artistic and technical masterpieces. Although initially created and designed for entertainment, video games have also begun to explore the realms of philosophy and push the boundaries of the definition of entertainment. Fascinated by the potential of this medium, both artistically and philosophically, I created a game that explores qualia¹, consciousness², and philosophy of mind through gameplay and story elements. The result of this makers-project is a video game called Project Contrast. Still in alpha state, with much more development time needed to progress the game to its initial vision, this game seeks to engage with players to consider their qualitative experience, to reflect on it, and to frame qualitative experience through gameplay and story. To accurately capture the development process of Project Contrast and how that process informed the final product, I'll first cover the makers' project, including general development information, animation, concept art for worldbuilding, and code. After covering the development process, I'll explore the functional gameplay that engages qualitative experience, the implications of behaviorism to video games, avatar projection, the perception of pixel art, the power of storytelling to guide thought, and the unique medium that video games offer.

Part 1: Creating Project Contrast

1.1 The Purpose of Project Contrast

As an artist, most of my creative practice centers around questions: the '*what ifs*,' '*hows*,' and '*whys*.' These questions are partly the reason behind my chosen career path as a concept artist – I get to continue making up worlds like I did as a kid. As a concept artist I ask questions: what if there was a giant floating tower where immortal birds lived? What would that look like? Why would it be there, and how do the birds live forever? (These questions focus on the society behind the first gate of Project

Contrast, exploring the qualia of vision.) This inclination towards questioning and a drive to create imaginary realities has also led me to a fascination with our reality and how we can experience this world: I became fascinated with qualia.

In his *Nicomachean Ethics*, Aristotle argues that humans have the final motivation for happiness. Theoretically, if asked *why* enough times, most humans will eventually explain their motivation behind why they do anything as 'to be happy' (Aristotle 13; bk. 1

¹ Qualia: A definition you can only point to, it is the qualitative experience of life, what it's like to see the oranges of a sunset, smell coffee, hear birds chirping, feel sand beneath your feet, or taste a raspberry croissant. Qualia is what the phenomenal consciousness experiences.

² Consciousness: There are two types of consciousness, access consciousness and phenomenal consciousness. When referring to consciousness in this paper I will refer to phenomenal consciousness unless stated otherwise.

Access Consciousness: The connections in the brain that allows an individual to be aware without experience. A fan is going in the background, you don't direct your experience towards it, but when you do, you realize that you were aware of the fan the whole time.

ch. 7). Happiness, however, is difficult to describe as it's not something completely tangible. When asking others the question 'what is happiness', many I asked would either respond with things (shelter, food, warmth), other abstract concepts (freedom, fun), or describe it as a feeling using synonyms (the feeling of joy), but never the definition of happiness. Dictionaries even use circular definitions to define happiness, "happiness: a state of well-being and contentment" (meriam-webster.com). Happiness is a qualitative experience; qualitative experiences will inherently be circular in definition. Language can point at what it's *like* to experience qualia, but it has yet to define qualia more accurately. Currently, philosophy and science only have theories about consciousness. We have no methodological way of researching qualia, leading some philosophers to believe that experience and qualia are mere illusions – in other words, qualia do not exist. An old colloquial term to describe qualia and consciousness, used in the philosophy of mind, is to describe it as 'The most mysterious yet most familiar thing we know.' (If you ever need a good riddle, this is a great one). We all *seem* to experience consciousness, which is the primary driver of purpose for most of humanity. Still, it's challenging to establish a fundamental understanding of consciousness beyond first-hand experience. So, being the fiercely curious questioner and observing the importance of this mysterious phenomenon, I curated my own attempt at understanding qualia and consciousness. I created an alternate reality in the form of a video game that allows players to reflect on their qualitative experience through gameplay and story.

When deciding to make a video game, I anticipated accomplishing much more than I did in the year-long time frame given. The original scope of Project Contrast was to have

finalized a seventh of the game; consequentially, there was concept art for the first section of the game that I never implemented in version alpha 1.0. As of the writing of this paper, Alpha 1.0 functions through the introduction section, titled *The Labyrinth*, and highlights vital game mechanics that reveal how video games can explore consciousness and qualia. The Labyrinth only scratched the surface of what I hoped to explore, as I learned the hard way that independent game development is no simple task, especially when beginning with limited coding experience. The Labyrinth explores the possibilities of heuristic storytelling in video games, avatar projection, and the qualitative functioning behind visual memory. Still, I will need additional development time to progress these elements. Altogether, Project Contrast is a complete presentation of about twenty to thirty minutes of gameplay.

1.2 Video Game Art and Initial Plans

Sometime in January of 2022, I ran to Gasworks Park, Seattle. It was dawn; the sun had just peaked above the horizon and warmed the cool air. There was frost on the grass, the city quiet. My mind sleepily rummaged through ideas about what I could do for my Honors project. Having taken a neuroscience course that spiked my interest despite my limited studies, I knew I wanted to create a project centered around consciousness or qualia. Fortunately, the neuroscience of consciousness and qualia significantly overlaps with philosophy, a subject that I am also interested in. But how I could relate the project to art and my major remained a difficult connecting question. I am a concept artist in the video game industry but have yet to create my own game. In the past, I had tried developing a small game named Skortor, but that development project did not progress far. As I was processing these thoughts, the idea began to coalesce. I

ran on the trail leading up to Lake Union, the lake surrounding Gasworks Park, and the final idea took shape. I took a mid-run rest to look out over Lake Union and called my mother to hash out my thoughts, an essential step in my most extensive creative endeavors. Talking with her, I scribbled down my ideas in a small notebook I carry to write down ideas. The idea: a video game that utilizes interactivity to engage qualia, worldbuilding to focus on the close connection between reality and consciousness, and the story of seven gates. The structure of the game is as follows:³

- *The Labyrinth* is the introduction to Project Contrast and has been my testing ground for learning how to create a video game. The Labyrinth holds many secrets and is the final key to finishing the game. The most notorious non-player character (NPC)⁴ found in the Labyrinth is Unco Bomba, who serves as a metaphor for the unconscious mind, appearing as a supporting character in nearly every gate.
- *Gate one* explores the qualia of vision, utilizing gameplay that focuses on visuals. For worldbuilding purposes, I developed a society of immortal birds, their capital a tower in the sky - a tower that is secretly a giant telescope. But the birds have a problem – they are going blind. The name "Project Contrast" came from this part of the game, as there is no sight without contrast of values, hues, and chroma.
- *Gate two* explores the qualia of hearing, utilizing gameplay that primarily uses audio cues. The NPC the player works within this gate is a split-consciousness

cyborg that sacrificed their hearing to connect with their split consciousness.

- *Gate three* explores the nature and theories of consciousness by presenting a narrative that examines the problem of other minds. This section of the game introduces two NPCs, Dancer and Thrush, who are traveling to the Tower of Oculi together, hoping to receive answers to their questions. Dancer and Thrush have two opposing views about the nature of consciousness, views that inform how they live their lives. Dancer believes in the irreducible quality of qualia, but Thrush believes that qualia is an illusion. Their conversations with the player become increasingly metaphysical as they explore the question of reality and whether they are fictional characters in a video game.
- *Gate four* explores survival and the natural proclivity for experiential beings to stay alive and continue their experience. Here the player travels through a desert with the Waterman, an NPC who explores the purpose of survival.
- *Gate five* explores agency and its relation to consciousness; how do qualia remain separate from theories of determinism, and how can player choice in video games affect their qualia?
- *Gate six* explores negative qualia, such as pain, by presenting a fictional player character who became stuck in their game. This 'player' (colloquially referred to in my notes as Player 2) has the same seven gates as the player but cannot complete

³The plan and layout for the Seven gates developed much further than the initial ideas formulated at Gasworks Park. Even now, some of the gates have received much more development than others (such as gate 2, that received some development time, but not the same amount as Gate one, three, six, and seven)

⁴ NPC: Non-player character.

their seventh gate because it involves ending the game.

- Gate seven explores identity, death, and how the two relate to consciousness, exploring the end of Project Contrast as a game. When the player shuts off the game upon completion, will their player character continue to exist? What about all the NPCs they met along the way? Gate seven tasks the player with returning to the Labyrinth.

Some gates have received substantially more development time than others simply due to time constraints. I share the background of undeveloped portions of Project Contrast so that when discussing the introduction portion of the game, there is context of the project's initial scope. I decided to develop Project Contrast using Gamemaker Studio 2, a game development program I took classes for in middle school. I had also tried using Gamemaker to develop a video game the summer before my sophomore year of high school, the aforementioned Skortor. Although I never advanced beyond coding the movement and animations for Skortor, the experience of attempting to create that game and my desire to focus on worldbuilding for the world of Skortor significantly contributed to my eventual pursuit of concept art for video games. The art for Skortor also took heavy inspiration from Hyperlight Drifter (HLD)⁵, a video game developed by Heart Machine and released in the spring of the same year I began development on Skortor. Skortor served as the progenitor of Project Contrast, guiding many stylistic decisions, as Project Contrast also took significant inspiration from Hyperlight Drifter.

⁵ HLD: Hyperlight Drifter, a video game created by Heart Machine, released in 2016.

Suspended Experience: The phenomenon when humans temporarily believe in the imaginary, be it a world in a book, movie, or video game,

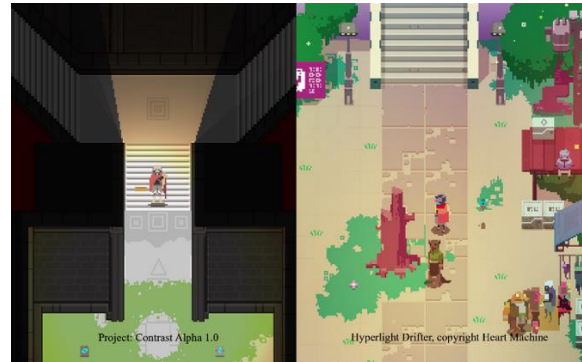


Fig 1. *Project Contrast*, 2023. Heart Machine, *Hyperlight Drifter*, 2016

There are two reasons for HLD as a primary source of artistic inspiration: its pixel art style and the initial inspiration HLD gave me to create my first video game Skortor. Heart Machine made HLD in Gamemaker Studio 2; knowing how to use the program inspired my first video game attempt, Skortor, in 2016. As for the pixel art style, after some training, I found I could create pixel art much quicker than my typical painterly style. I knew that I would spend a significant amount of time learning how to code, and I needed to create the art for the game quickly while still expending effort into intentionality behind the designs. I took an independent study in the Spring of 2022 and studied pixel art videogames, attempting to replicate the art in video games like *Eastward*, *Earthbound*, HLD, and various older *Pokémon* games. While I scrapped much of the work from my independent study for newer work, the independent study was a great introduction to creating good pixel art. As of writing this, though, I still have much to learn about transferring my art fundamentals into pixel art.

suspended experience is characterized by when partakers in whatever form of media become attached to the happenings within fictional worlds.

1.3 Animation and Gamer Juice

After learning how to create pixel art that wasn't fancy colored blobs, I learned about animation. Most video games need animation; without it, they become picture books. Some video games get away with little to no animation. These video games are often known as point-and-click adventures: the player navigates a 2D or flattened 3D environment and clicks on-screen elements to learn more and explore. Usually, however, video games require something known as 'gamer juice.' Gamer juice is the endearing umbrella term many game developers refer to the special effects, sound effects, and animations most commonly found in action video games (although non-action games like farming simulator *Stardew Valley* also make heavy use of 'gamer juice'). Although not necessary in abundance, gamer juice can create more immersive gameplay experiences by engaging the player with sensory experiences—an example of gamer juice: audio-visual feedback that gives players further information beyond tactile button presses. In nearly every mainline Pokémon game, for instance, pressing a directional button becomes sprinting through a grassy field through the implementation of animated grass, swishing noises as the player character moves through the grass, and the animation of player character movement. This gamer juice increases game immersion, further contributing to avatar projection and presence, a topic discussed later in section 2.2. Because Project Contrast focuses on qualia and consciousness, gamer juice became necessary due to its increased immersion and inherent sensory experience.

The first step in creating this 'gamer juice' was to add animation to player character movement. In the same quarter of my independent study, I took an animation class and worked on player sprite animations. This class made me realize that animating pixel art was no easy task. When animating

traditionally, it's somewhat straightforward: draw the shapes and lines the distance they move from the last frame (I should note, however, that any type of animation is complex, which is understating the craft). Pixel art adds a complication: everything must move in one-pixel increments. While this might seem straightforward, as there are fewer options to choose from regarding where to draw the next frame, increments in animation create difficulty when trying to show slower or faster movement than those increments allow. If the character needs to move their arm half a pixel per frame, it's trial and error to figure out what feels right regarding when and where to move that pixel. After many hours of trial and error, I eventually created a walking and running animation for the player character. I made a few animations that I never implemented into the 1.0 alpha of Project Contrast, primarily due to time constraints and my lack of coding knowledge. The implemented animations increase gamer juice significantly due to their instant tactile-visual feedback, such as the running animation below.



Fig 2. *Left Running Animation*

1.4 Concept Art and Worldbuilding

My background in concept art informed the visual direction and story of Project Contrast. The integral role of suspending disbelief in immersing players into video game worlds and, consequentially, worldbuilding's reliance on suspension of disbelief caused worldbuilding to become a primary focus of this project. Suspension of disbelief occurs when, despite players' knowledge that they are exploring a fictional world (be it in any form of media), they become invested in said fictional world, feeling emotional highs and lows with the flow of the story and experiencing a mental

state akin to flow state. Behind this suspended disbelief is believability. Levels of believability needed for suspension of disbelief can vary from person to person, but generally, believability doesn't rely on realism but rather cohesion. Any of Studio Ghibli's fantasy animated features are examples of this: *Spirited Away*, winner of an Oscar for best-animated film, has worldbuilding where unanswered questions about the world, the plot, and physical laws in its magical world abound. But these unanswered questions do not matter because realism is unnecessary for believability. By having many of these questions go unanswered, *Spirited Away*'s believability and world seem more mysterious through the unanswered questions.

Believable worldbuilding can curate immense emotional velocity, causing audiences to become invested in characters and people that never existed. This occurrence is due to an attribute unique to the human mind: our imagination. In his book, *Sapiens*, Yuval Harari explores how the human imagination empowers us, setting humanity apart from every known living creature, designing belief systems, governments, hierarchal systems, religion, and other systems of shared suspended disbelief. To clarify, using an example Hariri also used, government is not the buildings assigned to its offices or the people running said government. Those tangible things are instead the result of the idea and belief in government. Government is a non-tangible system that humans invented to organize themselves and mostly have a shared belief in. This shared imagination in concepts such as government is the same imagination people use for briefly suspending their disbelief in fictional worlds. Fans of a fictional series discuss characters as though they were real people, the events as though they occurred. Humans can warp the nature of reality through their imagination and belief systems

– lightning strikes were once the wrath of Zeus; today, we see them as a complex cause-and-effect through the lens of science. Framing the world is how humanity understands the world, and other than observable reality, we use the reign of imagination to concoct explanations about the observable. Worldbuilding takes this concoction one step further by altering the nature of the observable, effectively creating a new fictional world.

Qualia and experience rely upon observable reality to take in information. While humans might have reign over how they interpret and imagine the observable, until the advent of movies and video games, the altered observable was limited to books, paintings, and plays. The introduction of video games gave developers and creators complete control over the creation of new experiential worlds, now only restricted by their imagination and hardware limitations. This introduction of control over the observable, the ability to create simulations, is akin to creating micro-realities. While these micro-realities might just be code and art on a screen, through the integration of suspending disbelief into the worldbuilding, these worlds can seem real at times.

Concept art is vital to suspending disbelief as it generates new ideas that are unique through the curation of existing ideas. It does this by utilizing a variety of visual rules that have taken me years to learn. Creating a unique idea involves integrating utility and form, combining several aspects from real-life references. When designing the Tower of Oculi for Gate 1, I wanted to create a floating tower in the sky. While this idea is fantastical, it is not unique, and many creatives have already made sky tower several times. Combining the tower with a telescope adds further depth beyond a sky tower. My favorite visual rule I've learned plays a significant role in solving this tower-telescope combination: the 80-20 rule. The

80-20 rule adds to the believability of the concept by maintaining the cohesion of ideas. 80% of the concept is a tower, something that is believable, large, and an environment to explore. In comparison, the 20% telescope creates an interesting aspect that sets the concept apart from other sky towers.



Fig 3. *Tower of Oculi*

Another key to creating believable concept art is iteration. Thumbnails are an industry practice used to iterate quickly. Thumbnailing involves creating small grayscale drawings the size of a 'thumb' to create an image that looks good while also ensuring it reads as what it is. Thumbnailing focuses on making concepts that look good and make sense.

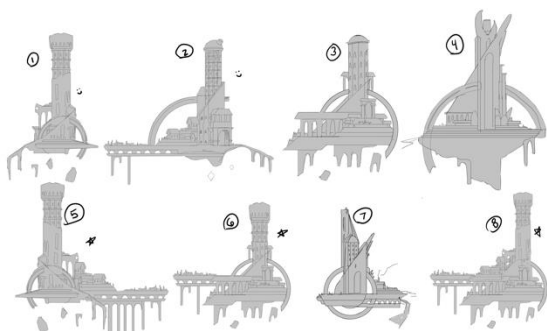


Fig 4. *Tower of Oculi Thumbnails*

Making beautiful imagery is essential to creating immersive experiences as it draws players into the world. Nearly every popular game has a polished visual style. Undertale,

a game with a relatively simple visual style, still became an award-winning game. Visually, Undertale maintained a cohesive style through about 80% of its sprite designs, maintained a similar color palette, and created architecture and creatures that matched one another. While examining games that don't sell well, many do not have a cohesive visual style; if they do, their visual style is neither unique nor well-designed. Players prefer playing beautiful-looking games over visually inconsistent or uncreative games. Beauty encourages immersion in video games because players will spend more time around beautiful and creative concepts than unpleasant or half-finished concepts. As for determining what is beautiful, most of my training in concept art has focused on training my eye for good concepts rather than explicitly explaining it with language. So, without swerving towards a philosophy of aesthetics, generally, I use the 80-20 rule to determine a good-looking concept. Using the 80-20 rule both in the shape language (80% large shapes, 15% medium shapes, 5% small shapes) and in idea generation (80% sky tower, 20% telescope) is the primary way I, as a concept artist, try to create beautiful concepts. In brief, beautiful designs in video games result from good concept art, good concept art encourages players to spend time in video game worlds. Through spending time in video game worlds, players become more involved in the world and thus have a higher chance of suspending their disbelief in the imaginary world.

1.5 Code to Function

Before this project, I did not know how to code beyond simple player movement. A massive obstacle for me at the beginning of the project, I anticipated picking up coding much faster than I did. I learned the hard way that I had to study the functionality behind code before learning how to code. When coding player movement, it is possible to

specify something as simple as: if the player presses an arrow key, move the player character:

```
(if input_check_pressed("left") {x = x - 2})
```

But this only accounts for movement to the left. As I learned more, I discovered there were ways to dive to the root of how GML functions and code 4-directional movement in only two lines of code. It's worth noting the *"input_check_pressed()"* is a scripted function that I added to my Gamemaker project, with credit to developer Juju Adams. Not built in Gamemaker, *"input_check_pressed()"* and its script has much more complicated code behind its simple exterior. Adding to the complexity of learning how to code, nearly every simple line hides far more complex code behind it.

Admittedly after one year of learning and practicing, my knowledge has not grown much, but I learned enough to code for this project. Since I was using Gamemaker Studio 2, I used their built-in language, Gamemaker Language (GML). GML is like JavaScript, but not the same, as many video game specific functions highlight it as a language purposely for coding video games. Learning how to code felt like learning a new language, except there are specific syntactical structures to remember instead of grammar. All of GML is English, such as *"draw_rectangle()"*, but learning how to utilize *"draw_rectangle()"* is like learning an entirely new word.

Although I cannot speak to the way code functions - my expertise lies in art – as I coded this game, the process reminded me of the Chinese Room thought experiment put forth by John Searle. The Chinese Room is a thought experiment that places a fluent English speaker in a room full of Chinese characters. English instructions are given to the English-Speaker to order the Chinese

characters in a particular manner (A goes to B as C goes to D, and so on.) The output of the Chinese room is strings of Chinese sentences, indistinguishable from that of someone fluent in Chinese (Searle 236). The thought experiment posits: does the English speaker ever understand Chinese, and if not, does that prove consciousness requires semantics? Answering that question right now is irrelevant; as I coded, I would create results. When I used *"draw_rectangle()"* to draw a rectangle in the middle of the screen, I received results from a few strings of letters. How could the computer do this? From something as simple as *"draw_rectangle()"*, how did it know to draw a rectangle? Does the computer understand some form of code to produce the result of the rectangle, or is it only producing the syntactical results like the English speaker in the Chinese room produces results? As I said before, this question was outside the time frame of the Alpha version of this project, but it nonetheless informed my game creation process. While coding, these thoughts inspired the characters of gates two and three.

Part 2: Video Game's Philosophical Possibilities

2.1 Video Games as a Unique Medium

Video games serve as simulations and alternate worlds where players can briefly suspend their experience. Books and movies also suspend experience, but they do so in different ways. Books/written stories allow audiences to co-author the world they explore, drawing from their imagination and memory to build up the look and feel of the world. Readers are the main drivers of the world-without reading, the world does not progress forward. Because of this reliance, readers are co-authors of the stories they read, drawing from their life experiences and visual library to construct the scenes and characters in their

imagination. While this unbridled control over worldbuilding gives readers complete reign over the look and feel of their mental movie, they can never share this mental movie with others unless they transform their vision of the book into another form of media. Movies do the opposite of books, framing everything and imposing the role of spectator onto the audience. Films present images and scenes to the viewer rather than relying upon the viewer to imagine images and scenes. When the viewer presses the play button, the world moves forward independently from the viewer. Video games, like movies, frame most of the world for the audience but do not allow players to act as spectators, instead asking players to drive the world forward by making decisions that affect the outcome of said world. This trait is unique to video games, with only a few notable exceptions of books and movies doing the same, notably any *Choose Your Own Adventure* book or the *Bandersnatch* Netflix movie. Popular culture considers both video-game-like; *Bandersnatch's* story even centers around video game production. I am fascinated by video games as a device to tell stories and present art due to their immersion, mimicking the choice of reality while presenting an engageable and observable reality separate from the player's imagination. This separateness allows for simulating how we study reality and experiential perception. There is a basis for reality (the video game world) and an interactive component allowing for responses affected by experiential perception. This unique combination, setting video games apart from books and films, allows for examining how experiential perception responds to various environmental and world changes.

2.2 Avatar Projection and Presence

Players might often describe their gameplay experience as immersive, especially when games engage players in experiential situations. We can measure how immersive these experiential situations are by their sensory realism. Sensory realism does not entail creating a realistic game in the sense of perfectly mimicking reality, but instead measures the game's ability to engage the senses in the same full range as reality. While it's challenging to measure sensory realism as it is qualitative and inherently subjective, we can subsume the five senses and gauge the player's level of sensory stimulation either by asking the player or by measuring their brain activity. I have already discussed beauty's importance to immersive experiences in section 1.4 and how beauty can play a crucial role in encouraging player engagement. Avatar Projection is another aspect unique to video games that increases immersion and sensory realism. Movies also have sensory realism, primarily engaging sight, hearing, and sometimes smell at a few theatres, such as the Universal Studio's Simpson's Theatre ride. However, movies do not have avatar projection. Avatar projection in video games refers to the phenomenon where players become deeply immersed in their video game avatars to the point where they begin to identify with them as if player characters were their own bodies. Avatar projection leads to players projecting their own identities and personality traits onto their player characters and feeling a strong emotional connection to them. This Avatar projection occurs when sensory realism integrates feedback with player input, such as the player's character moving and having sound play when the player presses buttons on a controller (i.e., the gamer juice mentioned in section 1.3). Virtual Reality (VR)⁶ games are significantly advanced at

⁶ VR: Virtual Reality, and environment completely contained within a simulated space, but explorable and interactable with VR goggles.

avatar projection because VR is more capable of convincing players of *presence*. Presence is like avatar projection as both define the level of player immersion in video games. Still, while avatar projection measures the amount of self-identification a player has with their player character, presence refers to the subjective feeling of existing in a virtual environment and experiencing it as if it were real. It's worth noting levels of Presence, and Avatar Projection tend to coincide. VR can especially convince players of presence and avatar projection as it can engage more avenues of sensory realism (Heeter 264). Player hands sync with their VR avatars' hands, most VR sets have surround sound audio, and some developers such as MANUS are creating VR gloves that cause hands/fingers to work in VR without a controller, using haptic feedback to provide touch sensitivity when you interact with VR objects.

While I do not have the development experience to create a VR game, thankfully, any game can provide players with a convincing experience when engaging enough senses. As mentioned throughout part one, gamer juice, good design, and believability, a result of concept art and worldbuilding, play significantly into presence and avatar projection for non-VR games. In Project Contrast, I designed the dialogue system to focus on giving the player choice in dialogue responses, which affect the reaction of non-player characters (NPC). This dialogue system provides the player with an identifiable link between themselves and their player character – they choose how their player character responds. While I hoped to add character customization, a feature that significantly increases avatar projection through the player's ability to create a player character they identify with,

⁷ Devlog: Development log, essentially a journal tracking the development progress of a video game.

my lack of time and development experience prevented me from doing so. To compensate, I made a simple player character design that is genderless, bald, with a simple face and non-human skin color: gold. These design choices present the player character as a blank canvas on which players may project themselves. The one trait of the current character design that interferes with this is the player character clothing: a red cloak, a pauldron, a blue visor, and baggy pants with a golden gate insignia.

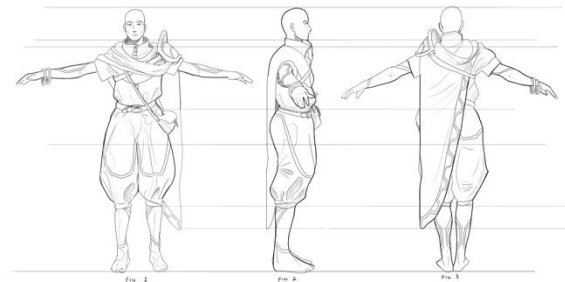


Fig 5. *Player Character Turnarounds*

In the future, I hope to integrate items and wearables with which players can customize their character. These items would act as bonuses, helping the player to solve puzzles, find secret items, and unlock new areas. This item integration for player character customization would increase avatar projection and create a more responsive game environment. This responsive environment, where player choice affects game surroundings, is critical to creating presence in video game worlds. Aarthificial, an independent video game developer, explains how he created environment-aware dialogue in their 23rd video devlog⁷. When the player jumps, NPCs⁸ respond by commenting on the height

⁸ NPC: Non-player character.

and quality of the jump (Aarthaficial 0:00 – 1:14). The environment-aware dialogue fosters a greater sense of presence in video game worlds due to the liveliness it produces. Most games become predictable after one playthrough, as there are limited responses to player input. This lack of response variety leads to stagnation and predictability of the game world, a limitation in many video games that prevent them from achieving sensory realism. Many games have dialogue lines that repeat too often, such as "I took an arrow to the knee" (Skyrim) or "It's super effective!" (Pokémon), that lead to stale gameplay.

The opposite, however, produced by environment-aware feedback, evokes a sense of presence as the game world responds to the player like reality responds to individuals. Depending on individual actions, results will vary. This environment-aware dialogue requires advanced coding that I am not yet capable of. Writing all the code for every possible action also becomes tedious, as every possible player response necessitates consideration and the creation of text, assets, and code. One result of this work-intensive implementation has historically caused many games to implement linear gameplay⁹, preventing players from interacting with game worlds in a way that would add further environmental factors to consider for environment-aware responses. With the advent of various coding technologies in recent years and considering the partially context-aware text-generation AI such as ChatGPT¹⁰ 3.5 and 4.0, implementing environment-aware responses and dialogue will likely become easier with time. Considering this, and as I learn more, I hope to employ environment-aware response and dialogue in later iterations of Project Contrast.

⁹ Linear Gameplay: Gameplay that has a linear path that players cannot deviate from. In classic 2D Mario games for example, the player can only ever move forward, and not backward.

These future updates will increase players' presence and avatar projection, furthering Project Contrast's goal of engaging reflective player responses to their own qualitative experience.

2.3 Heuristic Storytelling

Heuristic storytelling creates narratives that allow players to discover deeper contextual layers in narratives beyond surface-level presentation. Two factors contribute to a heuristic narrative that supports Project Contrast's goal of engaging reflective responses about qualitative experience.

The first is multiple dialogue options that provide diverse contextual information for the player to understand the game world. As discussed in section 2.2, the variety of context-specific responses significantly increases presence within video games. By giving players a choice over their in-game responses, games curate a more dynamic experience that leads to a sense of in-game agency and control over the story's direction. This agency gives players the opportunity for personal investment in the outcome of their choices, outcomes that might result in different qualitative experiences. In real life, I might open a window to hear the birds singing and the low hum of the city, or I might keep it closed, muffling the sound and changing the qualitative experience. This control over the qualitative outcome allows players to experiment with how their actions affect their surroundings. By integrating it with storytelling, this experimentation gains further significance as it produces different plot outcomes, affecting the game world's NPCs.

The second is dialogue that initially appears vague without further

¹⁰ ChatGPT: A large language AI model based on the GPT (Generative Pretrained Transformer) architecture that allows for legible context specific text generation.

contextualization of gameplay. An example: In the introduction of the game, System 6¹¹, an integral supporting character, asks the player if they can see, and if the player responds 'yes,' System 6 then asks the player *what* they can see. If the player picks the option 'I see outside the screen' in response, System 6 will comment, 'It seems you have yet to sync with this world fully.' While ambiguous at first, as the player plays through Project Contrast and discovers the various qualitative phenomenon presented by video games and discussed in this paper (particularly avatar projection in this case,) System 6's response becomes a comment about the player's qualitative experience and their level of avatar projection. This meta-level comment by an NPC stimulates consideration of personal qualitative experience by causing the NPC to seem self-aware of its situation as a character within a video game. By presenting seemingly self-aware characters, the chance for suspension of disbelief increases (section 1.4), furthering the overall goal of gameplay immersion as the characters seem self-autonomous and have their own qualitative experience.

Both the usage of multiple dialogue options and vague yet seemingly meta-aware dialogue contributes to a narrative that reaches toward self-awareness. While A video game likely can't be self-aware with our current technologies and understanding of the root cause of consciousness, creating a seemingly self-aware game can help direct player thoughts to their self-awareness, encouraging reflectivity.

2.4 Perception of Pixels

Humans have a unique ability to understand abstracted shapes and to form an understanding of what those abstracted shapes represent. In his comic,

Understanding Comics, Scott McCloud provides a framework for human knowledge of abstraction: a triangle with the labels on each corner: "Picture Plane," "Reality," and "Language" (McCloud 51). The unique attribute of this framework is that it captures the various ways humans understand images and the multiple levels of perception required to assign meaning to those images. In the left corner is reality: perhaps the easiest to understand. Reality is without abstraction because it's our basis for understanding any form of abstraction. In this part of the triangle, a face looks like a face. Moving to the top is the Picture Plane, dominated mainly by forms and metaphysical ideas like a circle or square. The picture plane is the most abstract of the three as the meaning is much more qualitative and may shift from individual to individual. For example, any abstract art might fit, as it allows viewers to speculate about the meaning of the various shapes. In the lower right corner is language. Language is the furthest abstraction of images but differs from the picture plane as language can retain all an image's meaning while becoming something entirely different. For example, the word 'mountain' is not a mountain, but it represents all the meaning of a mountain without looking like a mountain. Some other languages with iconographic features move towards the reality plane; some specific characters will occasionally look like what they represent. For example, the symbol for a mountain in Chinese and Japanese, 山, looks somewhat like a mountain.

¹¹ System 6: An integral supporting character, in the lore of Project Contrast, System 6 is the connecting link between the player and the video game world.

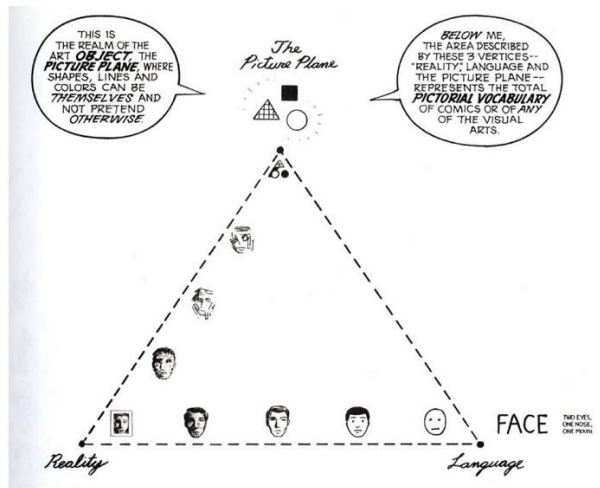


Fig 6. Scott McCloud, *Understanding Comics*, 2018

Considering McCloud's framework in the context of Project Contrast, a pixel art video game, the game explores the different levels of abstraction and perception required for humans to assign meaning to pictures and symbols, just as McCloud's pyramid captures the various ways that humans understand pictures. This exploration of abstraction allows for flexibility with the medium, and the abstraction of reality provides an opportunity to challenge how players experience the video game world. The primary way it does this is through the building block of the pixel:



Fig 7. Pixel

Depending on the representational goal, the pixel is at the top of the picture plane, but if it's representing a square, it could be more toward the language side. When adding onto this pixel, further meaning and context created by those additional pixels allow players to explore the minimum amount of information needed to assign meaning and identification to qualitative perceptual information.



Fig 8. *Expanded Pixel*

By expanding the initial pixel and adding two more pixels at the top, a shape that could be a pan, bottle, pipe, or traffic cone emerges. The silhouette of the object provides information on what it *could* be. This unknown is where pixel art video games step into the realm of books, allowing players to assert their imagination onto the game world and providing additional insight into how we each construct our understanding of reality. One player may see something else than another player, a unique attribute of pixel art characterized by its ability to bounce around McCloud's triangle framework. Experimenting with changes in these pixel shapes and implementing these changes into the gameplay and storytelling of the game world allows the player to reflect upon how their qualitative perception affects their understanding of reality. Adding additional information like color to the silhouette strengthens whatever that silhouette represents. But the simplicity of pixel art still allows for imaginative abstraction. Does the pan look like a pan? It could instead be a wrench or a hammer.



Fig 9. *Contextualized Pixel*

I implemented this perceptual irregularity inherent to pixel art into the story of Project Contrast by starting the game in a simplistic simulation that consists of only black and white pixels. System 6 tells the player that they are in a 'micro-simulation'

used to learn the game's controls. It is the furthest abstraction from reality, turning the player into a pixel, and serves as an example of reality devoid of qualitative experience. The qualitative experience still exists; text and the player pixel remain visible. But it's a simplified game world to the point that the information gained from the game world is limited and instead up to the player's understanding and imagination.

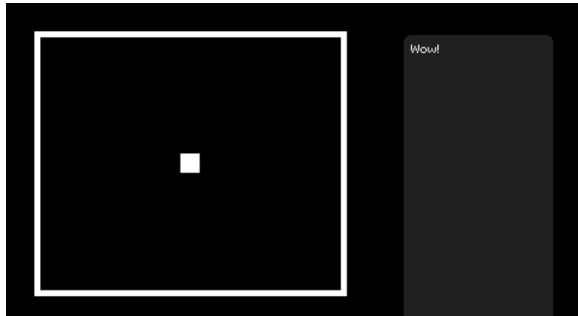


Fig 10. *Opening Sequence*

This simple game world then progresses to an opening sequence where sequential art in a pixelated cartoon style plays the most realistic portion of the game. The purpose of this realistic portion is to imply that there exists an objective reality beyond the pixel art presented to the player. Beyond what players think particular pixel art represents, there is an objective reality behind player perspective (the pan is a pan, despite appearing as a wrench, for example).



Fig 11. *Narrative Image 1*

Incorporating this into the story, the sequential art glitches as the player looks at

their hands, and the view pixelates as the game loads into its top-down pixel perspective. This conversion from realistic visuals to more picture plane/iconographic-based visuals allows players to make inferences about the game world that will affect their experience. Although pending implementation, this could work in the Project Contrast by inquiring the player about what they see in an abstract pixel shape, like the previously discussed red pan shape. The player's response then would affect the outcome of what the object is: A strange pixel artifact found in the tower of Oculi could turn out to be a key when the player can identify it as such. This reality-changing perception serves as a commentary on how our frameworks derived from qualia can change our understanding of reality.



Fig 12. *Narrative Images 2 and 3*

2.5 Pressing Buttons or Playing a Game?

Behaviorism is the philosophical idea that asserts behavior is the only observable trait and insight that others are conscious (the problem of other minds). Consequentially it is the only unit we should worry ourselves with measuring. Today humanist psychology and philosophies of mind have largely replaced this belief, making space for qualitative experiences. Still, behaviorism asserts a strong point about observation and the consequent assumptions we can draw about other's brain states purely from behavior.

If we were to measure someone as they played a videogame: the fluctuation of brain waves and the variations in heartbeat, the location of where their eyes looked at the screen, and the buttons they pressed on the controller, then we might garner information about the genre of the game. Suppose the

player plays a competitive action-fighting game. Player heartbeat might increase for an extended period, and an fMRI might show activity in the premotor and parietal cortex. Their eyes will linger toward the screen section where their player character is located and dart to the informational windows on the sides of the screen. Suppose they are playing an RPG¹² story game. In that case, their heart rate might only spike during periods of duress in the story, the prefrontal cortex will have increased stimulation, and player's eyes will spend most of their time focused on wherever the story text is on the screen (Saito et al. iee.org). But from these behavioral markers, we only garner what genre of game the player engages with and perhaps the location of certain elements on the screen.

What If we removed the screen and knowledge of video game assets, gameplay, and story from a research sample that studied what video game a player was playing? The only thing we would have to answer the question of "What's the video game?" would be the player's behavioral markers; let's exclude asking the player about the video game for this thought experiment. We might measure brain activity and where the player's eye focuses, where their heart rate increases, and the patterns they press buttons on the controller. With this information, especially the brain activity information and using current technology, we may guess what's on the screen based on cross-referencing brain activity with neural correlates. We might gather the same information if we asked the player what they were experiencing as they played the game. But we miss one key feature: we cannot collect any information as to what the experience of the game is *like*. What the character models look like, what the music sounds like, or what the gameplay is

like. From a behavioral standpoint, we can gain insight into the video game genre and how players engage with it. Still, we cannot fully understand their qualitative experience of the game solely through behavioral markers. Even if we were able to capture and measure every aspect of a person's experience while playing a video game, capturing their "movie inside their head," as philosopher David Chalmers puts it in his Ted Talk (Chalmers, 0:09 – 0:14), it still wouldn't tell us everything we could know about the game if we played it ourselves.

While it seems science fiction to recreate the 'inner movie,' it could be possible in the future with better brain imaging and integration of neurotechnology like Neuralink and Kernel. With these and future technologies, entirely re-creating qualitative experiences based on brain activity could be possible; that is if qualia and consciousness are dependent upon physical structures in the brain. But a movie will never capture video games' whole qualitative experience: mainly how video games give players the autonomy to interact with the game world in whatever way the coding parameters allow. While the lens of behaviorism can gather much, especially as technology advances, many video games may appear similarly through a behavioral lens. Player behavior between different games is largely similar: pressing buttons, eyes darting around a relatively small space, and activity in the prefrontal, premotor, and parietal cortexes. Anyone who has played multiple video games can likely attest to each video game's vast range of experiences despite the similarity in player behavior. The competitive MOBA ¹³League of Legends is a vastly different gameplay experience than the open-world puzzle-exploration *Zelda: Breath*

¹² RPG: Role-playing game, a game that is designed with player decision as the main gameplay aspect.

¹³ MOBA: Massive-online-battle-arena, a competitive game that is usually a top-down perspective.

of the Wild, as that game is still different from the open-world RPG experience found in Elder Scrolls V: Skyrim.

Removing the inner movie from the context of the viewpoint leaves us with just that, a movie. Video games are more than movies; they are *games* with interactive elements you must play and experience to gain the full range they offer. This interactivity is a critical defining feature of games that sets them apart from books and movies, as the gameplay itself serves as a micro-reality, giving players autonomy and allowing them to explore and shape the world in ways that are unique from others' experiences. This level of agency and interactivity makes video games a unique and powerful medium. They are also one of the reasons why simulated reality theories have sprouted up in recent years. Theoretically, with enough computational power and code, we could capture the laws of physics and quantum physics, effectively creating a *video game* that perfectly replicates reality (Chalmers, "Reality+" 107). With all this said, video games offer more qualitative properties than both behaviorism and movies can show, further showing their incredible power as a medium to engage qualia.

2.6 Functional Gameplay

The first game mechanic other than dialogue implemented into Project Contrast, named in the project code as 'tile_game,' explores how unconscious memory interacts with conscious decision-making. This gameplay serves as the main progressor through the Labyrinth. When activating the tile game, a grid of 3 by 3 gray tiles appear; some tiles briefly flash white for one second before returning to light gray; this is stage one of the game. The player must then re-select the tiles that flipped over as white without making more than three mistakes. The level progresses if the player flips over all the tiles without making more than three mistakes. As

the level progresses, the tile grid increases by increments of one. At level two, the grid becomes four by four; at level three, the grid becomes five by five, and so on. After level one, the tile grid changes gameplay; instead of flipping over multiple tiles for one second, one tile flips over for ten milliseconds. The purpose of this game is to serve as an example in action of the way humans interact and experience visual information. Visual processing occurs in two stages: the first involves processing visual information; our brains extract information about the qualities of the visual experience. The second stage requires decision-making, where the viewer determines the relevance of this processed information and acts upon it. (VanRullen et al. 458). In the tile game, the speed at which the tiles flash past the first level distinctly separates these two visual processing stages. Usually, the two stages of visual processing overlap, where the viewer can observe and decide upon visual information simultaneously. You are doing this as you read these words – you examine strange symbols called letters, and the brain derives meaning from the symbols, thus, reading. But if the paper lost contrast between the dark letters and white background, becoming a blank surface, would you be able to continue reading as you did before? Due to the complexity of the visual information, probably not. The ability to cross-reference and continue examining complex visual information allows for reading; otherwise, we would have to rely entirely upon visual memory.

The mechanics of the tile game have the purpose of tasking the player with relying upon visual memory, allowing a short amount of time for the first stage of visual experience to occur, and then allocating time for decision-making with the absence of the visual information. As the grid increases in the number of tiles, the tiles become smaller; this increases the amount of complexity,

calling for players to maintain an ever-greater focus for visual processing. An added challenge to this is that the tiles have an ever-greater chance of flipping in the player's peripheral vision. These two facets of gameplay – ever-increasing complexity and greater reliance upon peripheral vision – engage attention without consciousness.

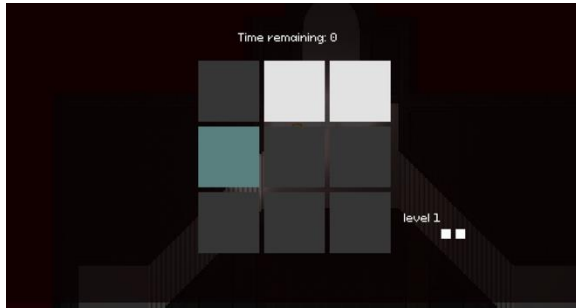


Fig. 13 *Tile Game*

There is debate on whether humans can have attention without consciousness. Still, research has shown that the two seem individually examinable (Boxtel et al. 6), and despite varying philosophical disagreements, consciousness does not work top-down over attention in every case. When playing the tile game at higher levels (level 10+), this becomes qualitatively apparent to players as their attention will lag behind their qualitative experience, realizing the tile has flashed and its consequent location only after the tile has disappeared.

The purpose of this gameplay mechanic currently has limited research use, considering it has no measurements programmed for how long the player takes to respond. Other brain measurements are impossible due to this project's limitations. This tile game serves primarily as an example for players to examine how their brain functions and to provide them with a first-hand experience of how the qualitative experience of vision works.

Conclusion

I intended to accomplish much with Project Contrast: research, art, coding, and sometimes I even hoped for some small discovery I could contribute to the research of qualia and consciousness that admittedly never came. While the final product is only a fraction of the initial goal, it's still much more than I would've hoped to accomplish after learning how difficult independently developing a video game can be. With this said, Project Contrast, as of alpha 1.0 effectively engages players to consider and reflect upon their qualitative experience. Project Contrast does this through functional gameplay that separates attention and qualitative experience in the tile game, a sense of presence and avatar projection through thoughtful worldbuilding, the implementation of 'gamer juice,' pixel art that explores how limited visual information affects perception, and using the power of heuristic storytelling to guide thought, all through the powerful medium of a video game. I explained my development process for creating this game and how my own qualitative experiences affected my development process, exploring realms of animation, concept art, worldbuilding, code, and the initial imaginative scope for the game. I had hoped Project Contrast would make a discovery about qualia. Still, I realized along the way that qualia is innately subjective, and any discovery would likely be a personal discovery about my own qualia. And so, instead of focusing on creating a research simulation, I created an experience I could share with others, an experience that encourages reflection on perhaps one of the most essential things in life: qualitative experience.

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Appendix

Symposium Panel Title: Framing Reality through the Lens of Creative Mediums

Everywhere we look, every day, and in everyplace there is beauty to be found. Even the smallest human child is awed and amazed by the pictures, stories, and sounds that fill our world. But how do humans know this? And how are we so certain that this knowledge of beauty is shared across all humanity? This panel seeks to analyze the often-hidden frameworks of beauty that exist in the world in order to better understand the human perception of this reality. Panelists explore various creative mediums, both as makers and as scholars, in order to examine the effects of immersive art in the creation of human experience.

Presented alongside Ketzalt Marquez's "*What our Hearts Crave for: An Examination of the Paradoxical Attraction to Dante's Inferno*" and Mackenzi Mehlberg's "*Understanding the Beauty of Mathematics by Composing Claude Debussy's Syrinx into Mathematical Equations*".

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It's dark, you can't see anything. There's a deafening silence, so quiet you can't even hear the low hum of nothing. Every sense you might have in your day to day life, the ability to smell, hear, taste, they're all null. You have nothing to experience, even the darkness seems to eventually fade.

But what of the opposite? It's a Spring morning in Seattle, you meander your way to your favorite bakery, hearing birds chirp, feel the rising sun on your face, see the blossoms and flowers of various plants in the warm light. At the bakery you meet with friends, ordering a raspberry croissant and a latte. Your qualitative experience is full.

Some might argue, including myself, that the positive qualitative experience of life is what makes it worth living. The beauty in smelling freshly baked goods, hearing music, or seeing the sun glint off budding blossoms. While I'm not here today to defend that claim, I'll leave that for another day, I am here to explore the mystery behind this strange thing we call qualia, and to share my creative project exploring it.

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Hello everyone, my name is Pierce Papke. I'm an illustration major who chose to dabble in game design and some philosophy for my Honors Research Project: Creating Project Contrast: a video game exploring consciousness and qualia.

Before we dive into this there are two things to preface this research project: First, I recognize that qualia is not a commonplace term, and because my entire project centers around qualia, I think it pertinent to explain. Whenever defining qualia, most definitions will be circular in nature: it is the qualitative experience of life, the raw, subjective "what it is like" aspect of our mental states. Qualia is what it's like to see the oranges of a sunset, smell coffee, hear birds chirping, feel sand beneath your feet, the taste of a raspberry croissant, or to hear my voice as I read words on this page. You might begin to see why defining qualia with one sentence is not easy, because the term captures such a great range of qualities about our phenomenal experience.

Second, This is a creative project. In the beginning, I hoped against hope for some sort of breakthrough discovery about qualia and consciousness, considering the difficulty in researching qualitative experience due to its subjectivity and circular explanations, I shifted the focus of Project Contrast to an avenue for player self-reflection and learning about their own qualia. So, while this project does not present breakthrough research, I hope it does present an opportunity for reflection on your own qualitative experience; I know it has for me.

Sometime in January of 2022, I went on a run to Gasworks Park, Seattle. It was dawn, the sun had just peaked above the horizon and warmed the cool air, there was frost on the grass, the city quiet. My mind sleepily rummaging through ideas about what I could do for my Honors project. Having taken a

neuroscience course that spiked my interest despite my limited studies in the subject, I knew I wanted to create a project centered around consciousness or qualia. Fortunately, the neuroscience of consciousness and qualia has significant overlap into philosophy, a subject that I also have interest in. But as to how I could relate the project to art and my major remained a difficult connecting question. I am a concept artist working in the video game industry but had yet to create my own game. In the past I had tried with a small game named Skortor, but that development project did not progress far. As I was processing these thoughts, the idea began to coalesce. I ran on the trail leading up to Lake Union, the lake that surrounds Gasworks Park, and the final idea took shape. I took a mid-run rest to look out over Lake Union, and called my mother to hash out the ideas, an important step in my most extensive creative endeavors. Talking with her, I scribbled down my ideas in a small notebook.. The idea: a video game that utilizes interactivity to engage qualia, worldbuilding to focus on the close connection between reality and consciousness, and the story of seven gates.

So, let's dive in.

When pressing start game on Project Contrast, the screen becomes enveloped in darkness. Similarly to the thought experiment at the beginning, the only qualitative experience you have is darkness, the 1's and 0's of binary code, and the world outside the screen, our world. Slowly, as you progress through the intro, a character named System 6 guides you towards activating your in-game senses: dialogue options, audio, controls, until something hijacks system 6, and the world of Project Contrast comes to life in bright, glitchy, color. The purpose of this intro is to both immerse the player by gradually immersing their senses into the game world, and through presenting a narrative that makes the game world feel alive.

This is the first aspect of creating qualitatively rich video games: world immersion, and suspension of disbelief. Suspension of disbelief occurs when, despite players' knowledge that they are exploring a fictional world, (be it in any form of media) they become invested in said fictional world, feeling emotional highs and lows with the flow of the story. Believable world building can curate immense emotional velocity, Audiences become invested in characters, places, and things that never existed. This is due to an attribute unique to the human mind: our imagination. In his book, *Sapiens*, Yuval Harari explores how the human imagination has empowered us, setting humanity apart from every other known living creature, designing beliefs, governments, hierarchal systems, religion, and other systems of shared suspended disbelief. To clarify, using an example Hariri also used, government is not the buildings assigned to its offices, or the people running said government. Those tangible things are rather the result of the idea and belief in government. Government is a non-tangible system that humans invented to organize themselves, and mostly have a shared belief in. This shared imagination in concepts such as government is the same imagination people use to briefly suspend their disbelief in fictional worlds. Fans of a fictional series discuss characters as though they were real people, the events as though they occurred. Humans can warp the nature of reality through their imagination and belief systems – lightning strikes were once the wrath of Zeus, today we see them as a complex cause-and-effect through the lens of science. Framing the world is how humanity understands the world, and other than observable reality, we use the reign of imagination to concoct explanations about the observable.

Worldbuilding takes this concoction one step further by altering the nature of the observable, effectively creating a new fictional world. And while humans might have reign over how they interpret and imagine the observable to be, until the advent of movies and video games, the altered observable was limited to books, paintings, and plays. The introduction of video games gave developers and creators complete control over the creation of new experiential worlds, now only restricted by their imagination and hardware limitations. I can now present a video game experience of a gradual waking in another world, a world where the player has autonomy.

But what of books, and movies? These also provide alternate realms of experience. Any watcher of a beautiful award winning animation like *Spirited Away*, or one of the high budget marvel movies, or even the captivating worlds of certain fictional books can likely attest to the suspension of disbelief that occurs. Video games are however unique from both of these:

Video games serve as simulations and alternate realities that players can assert their identity into. Books and movies also suspend experience, but they do so in different ways. Text presents audiences with the opportunity to co-author the world they explore, drawing from their imagination and memory to build up the look and feel of the world. Readers are the main drivers of the world- without reading, the world does not progress forward.

While this unbridled control over worldbuilding gives readers complete reign over the look and feel of their mental movie, they can never share this mental movie with others unless they transform their vision of the book into another form of media. Movies do the opposite of books, framing everything and imposing the role of spectator onto the audience. Movies present images and scenes to the viewer, rather than relying upon the viewer to imagine images and scenes. When the viewer presses the play button, the world moves forward independent from the viewer.

Video games, like movies, frame most of the world for the audience, but do not allow players to act as spectators, instead asking players to drive the world forward by making decisions that affect the outcome of said world. I am personally fascinated by video games as a device to tell stories and present art due to the immersion they provide, mimicking the choice of reality, while also presenting an engageable and observable reality that is separate from player imagination. This separateness allows for a mimicking of how we study reality and qualia – there is a basis for reality (the video game world), but also an interactive component that allows the player to respond to this objective reality based on their own qualitative experience of it.

Ensuring that this reality, the video game world, is immersive at all is a grand undertaking; and is one of the primary reasons art roles exist in the video game industry. The stark contrast between a game like Pong, and a game like Zelda Breath of the Wild or Tears of the Kingdom, shows the importance of cohesive worldbuilding and art to creating immersive worlds. Pong, like the introduction of my game, doesn't engage any senses beyond shape and simple player movement. Zelda however has godrays, swaying grass, character design, narrative design, level design, and SO much more. And all of these experiential aspects of the game required careful thought into both how they would look and work from an artistic standpoint, and then technical expertise to implement the most beautiful versions of them into the game.

Making beautiful imagery and mechanics is important to creating immersive experiences as it draws players into the world. Looking at the most played games, nearly every game has a polished visual and technical style. Players prefer playing beautiful-looking games over visually inconsistent or uncreative games. Beauty encourages immersion in video games because players will spend more time around beautiful, and creative concepts than they will around unpleasant or half-finished concepts. This is the primary reason I spent so much time worldbuilding and concepting for Project Contrast.

Another way we can measure how immersive these experiential situations are, are by something called sensory realism. Sensory realism does not entail creating a realistic-looking game, but rather the measurement of the games ability to engage the senses in the same full range that reality does. While it's difficult to measure sensory realism as it is qualitative and inherently subjective, we can subsume the five senses and measure the level of sensory stimulation either through asking the player, or by measuring their brain activity.

One way sensory realism appears full force is through something called Avatar Projection, which I will explain in a second. Project Contrast, after it's introduction, plays a sequence where you take on the role of a Nomad, a being that in the lore of this world is your avatar. In the game you play yourself, and take on the body of this avatar to explore the world as yourself. By tying the player character directly to the player as an avatar, I make the connection between the player character and player seamless by eliminating any identity incongruencies. So, avatar projection:

Avatar projection in video games refers to the phenomenon where players become deeply immersed in their video game avatars to the point where they begin to identify with them as if player characters were their own bodies. This can lead to players projecting their own identities and personality traits onto their player characters and feeling a strong emotional connection to them. This occurs when sensory realism is integrated as feedback to player input, such as the player's character moving and having sound play when the player presses buttons on a controller.

In Project Contrast, I designed the dialogue system in a way that focused on giving player choice in dialogue responses, choices that affect the response of non-player characters. This gives the player an identifiable link between themselves and their player-character – they choose how their player character responds. While I hoped to add character customization, a feature that significantly increases avatar projection through the player’s ability to create a player character they identify with, my lack of time and development experience prevented me from doing so. To compensate I created a simple player character design that is genderless, bald, with a simple face and non-human skin color: gold. These design choices present the player-character as a blank canvas that players may project themselves onto, allowing for further player immersion.

And this moves us onto our next point: pixels. Players can identify with a golden avatar, but what about when that avatar becomes a 32x32 pixel sprite? Humans have a unique ability to understand abstracted shapes and to form an understanding of what those abstracted shapes represent, this stems unsurprisingly from our imagination. In his comic, *Understanding Comics*, Scott McCloud provides a framework for human understanding of abstraction: a triangle with the labels on each corner: “Picture Plane”, “Reality”, and “Language”. Picture plane are abstracted shapes, reality is, well, reality, and language are the squiggly bits I’m reading of my sheet of paper. The picture plane is the most abstracted in meaning of the three as the meaning is much more qualitative and may shift from individual to individual. For example, any abstract art might fit, as it allows viewers to speculate about the meaning of the various shapes. In the lower right corner is language. Language is the furthest abstraction of images but differs from the picture plane as language can retain all of an images meaning while also becoming something entirely different. The word ‘mountain’ for example is not a mountain, but it represents all the meaning of a mountain without looking like a mountain in any way.

Considering McCloud’s framework, Project Contrast explores the different levels of abstraction and perception required for humans to assign meaning to pictures and symbols. This allows for flexibility with the medium, and abstraction of reality provides an opportunity to challenge the way players experience the video game world. The main way it does this is through the building block of the pixel.

Depending on the representational goal, the pixel is at the top of the picture plane, but if it’s representing a square, it could be more towards the language side.

Through expanding the initial pixel and adding two more pixels at the top, a shape emerges that could be a pan, a bottle, a pipe, or even a traffic cone. One player may see something else than another player, a unique attribute of pixel art characterized by it’s ability to bounce around McCloud’s triangle framework depending on what information is given to a player. Experimenting with changes of these pixel shapes and implementing these changes into the gameplay and storytelling of the game world gives an opportunity for the player to reflect upon how their qualitative perception affects their understanding of reality.

And finally, I will discuss a gameplay mechanic. The first game mechanic other than dialogue implemented into Project Contrast, named in the project code as ‘tile_game’ explores how unconscious memory interacts with conscious decision making. I will refrain from fully explaining it here, but essentially, it’s a working memory game where a tile in a grid flashes white for 0.1 seconds, and then tasks the player with reselecting the tile, the grid increases in size as the player succeeds. The purpose of this game is to serve as an example-in-action of the way humans interact and experience visual information. Visual processing occurs in two stages: the first stage involves processing visual information; our brains extract information about what we see. The second stage involves decision making where the viewer determines the relevance of this processed information, and acts upon it. Normally the two stages of visual processing overlap, where the viewer can observe and decide upon visual information at the same time. The mechanics of the tile game have the purpose of tasking the player with relying upon visual memory, allowing a short amount of time for the first stage of visual experience to occur, and then allocating time for decision making with the absence of the visual information.

When playing the tile game at higher levels the separation of these two processes becomes qualitatively apparent to players as their attention will lag behind their qualitative experience, realizing

the tile has flashed and its consequent location only after the tile has disappeared. This tile game serves primarily as an example for players to personally examine the way their brain functions, and to provide players with a first-hand experience of how qualia of vision works.

There was much I intended to accomplish with Project Contrast: research, art, coding, and sometimes I even hoped for some small discovery I could contribute to the research of qualia and consciousness that admittedly never came. While the final product is only a fraction of the initial goal, it's still much more than I would've hoped to accomplish after learning how difficult independently developing a video game can be. With this said, Project Contrast as of the alpha 1.0 effectively engages players to consider and reflect upon their qualitative experience. Project Contrast does this through functional gameplay that separates attention and qualitative experience in the tile-game, a sense of avatar projection through thoughtful worldbuilding, pixel art that explores how limited visual information affects perception, and using the power of storytelling to guide thought, all through the powerful medium of a video game. I realized along the way making this that qualia is innately subjective, and any sort of discovery would likely be a personal discovery about my own qualia. And so, instead of focusing on creating a research simulation I instead created an experience I could share with others, an experience that encourages reflection on perhaps one of the most integral things in life: qualitative experience.

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